Title of document: **AMARUQ PHASE 2 IVR WRSF PUMPING SYSTEM DESIGN REPORT**

Client: **AGNICO EAGLE MINES – MEADOWBANK DIVISION**

Project: **DETAILED ENGINEERING DESIGN OF WATER MANAGEMENT AND GEOTECHNICAL INFRASTRUCTURES PHASE 2 - WHALE TAIL PROJECT EXPANSION**

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LIST OF REVISIONS

Revision					Pages Revised	Remarks
#	Prep.	Rev.	App.	Date		
PA	DC	ALN	ALN	October 20th, 2020	All	Issued for internal review
PB	DC	ALN	ALN	October 23rd, 2020	All	Issued for client review
00	DC/HT	ALN	ALN	January 8th, 2021	All	Issued for study
01	DC	ALN	ALN	January 27th, 2021	1 to 3, 7 to 9	Issued for study

NOTICE TO READER

This document contains the expression of the professional opinion of SNC-Lavalin Inc. ("SNC-Lavalin") as to the matters set out herein, using its professional judgment and reasonable care. It is to be read in the context of the agreement dated September 10th, 2019 (the "Agreement") between SNC-Lavalin and Agnico Eagle Mines Limited (the "Client") and the methodology, procedures and techniques used, SNC-Lavalin's assumptions, and the circumstances and constraints under which its mandate was performed. This document is written solely for the purpose stated in the Agreement, and for the sole and exclusive benefit of the Client, whose remedies are limited to those set out in the Agreement. This document is meant to be read as a whole, and sections or parts thereof should thus not be read or relied upon out of context.

SNC-Lavalin has, in preparing estimates, as the case may be, followed accepted methodology and procedures, and exercised due care consistent with the intended level of accuracy, using its professional judgment and reasonable care, and is thus of the opinion that there is a high probability that actual values shall be consistent with the estimate(s). Unless expressly stated otherwise, assumptions, data and information supplied by, or gathered from other sources (including the Client, other consultants, testing laboratories and equipment suppliers, etc.) upon which SNC-Lavalin's opinion as set out herein are based have not been verified by SNC-Lavalin; SNC-Lavalin makes no representation as to its accuracy and disclaims all liability with respect thereto.

To the extent permitted by law, SNC-Lavalin disclaims any liability to the Client and to third parties in respect of the publication, reference, quoting, or distribution of this report or any of its contents to and reliance thereon by any third party.

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1.0 Introduction

1.1 Context

Agnico Eagle Mines Limited, Meadowbank Division (AEM) is developing the Whale Tail Project, a satellite deposit located on the Amaruq property (Kivalliq Region of Nunavut, Canada). The Whale Tail Project construction is ongoing and commercial production has started in the third quarter of 2019. To continue mining and milling, AEM is proposing to expand the Whale Tail Project by expanding the Whale Tail pit, developing another open pit called the IVR pit and including underground mining operations. As part of the expansion project, new water management and geotechnical infrastructures shall be required for surface water management.

The following technical note presents the pumping strategy and design of sumps that will be used to manage the surface runoff collected around the IVR WRSF. This design report for the IVR WRSF pumping system is submitted as per Water License 2AM-WTP1830, Part D, Item 1.

1.2 Mandate

SNC-Lavalin was mandated to:

- Design sumps around the IVR WRSF to evacuate runoff water;
- Design pumping pads, pumping stations and pipelines for water transfer from the IVR WRSF to the IVR Attenuation Pond;
- Produce appropriate documentation, including construction drawings to implement the retained management solution.

1.3 Reference Document

The following reference documents in Table 1-1 were developed for the IVR WRSF pumping system. All of the pertinent drawings developed for the detailed engineering for the IVR WRSF pumping system can be found in Appendix 1.

Table 1-1: Reference Documents

Document number	Version	Type of document	Description
61-695-200-203	R3	Process Flow Diagram	Whale Tail WRSF & Extension, IVR WRSF & IVR Attenuation Pond
61-695-205-211	R2	Process & Instrumentation Diagram	IVR WRSF and pumping stations
61-695-270-227	R3	Pipe layout	Pipe Layout Amaruq Phase 2
61-695-270-218	R3	Pipe layout	Pipe layout and profile of IVR WRSF area
61-695-230-212	R2	Civil & Geotechnical	Access Ramp and Pumping Pad of IWA, IWB, IWC and IWD Sumps

2.0 Contact/Surface Water Management

The contact water and surface water resulting from runoff water received from natural precipitation on both waste rock piles and natural terrain shall be collected in four (4) sumps around the IVR waste rock storage facility. For the Amaruq Phase 2 project, all water from the following four sumps shall be transferred to IVR Attenuation Pond (Figure 2-1):

- IWA sump: collects runoff from north-west area of the IVR WRSF;
- IWB sump: collects runoff from west area of the IVR WRSF;
- IWC sump: collects both natural runoff from the area to the north of the IVR WRSF (non-contact surface water) and contact water from the north-east area of the IVR WRSF;
- IWD sump: collects runoff from south area of the IVR WRSF;
- IWE sump: natural low point that collects runoff water from the north-east side of the IVR Attenuation Pond Catchment area and directs it toward the IVR Attenuation Pond

Water from IWA and IWB sumps shall be pumped by two different pumps and both discharge pipelines shall connect to a common discharge pipeline until the IVR Attenuation Pond.

Water from IWC sump shall be pumped to a highest point (El. 176 m) to the east of the IVR WRSF and discharge within the same catchment area of the IVR Attenuation Pond. From there, water shall follow the natural topography and gravity flow toward IWE sump (former A54 lake) and then overflow toward the IVR Attenuation Pond. Alternatively, water from IWC could also be transferred toward IWA.

IWD sump shall be used to manage water accumulation between the IVR WRSF ring road and waste rock storage facility that flows from IVR Attenuation Pond during a spring flood event that causes the water level in the pond to be high (i.e. > El. 164 m). Furthermore, IWD sump shall be used to pump out water that could accumulate in the former lake A52 due to runoff water percolation through the waste rock pile.

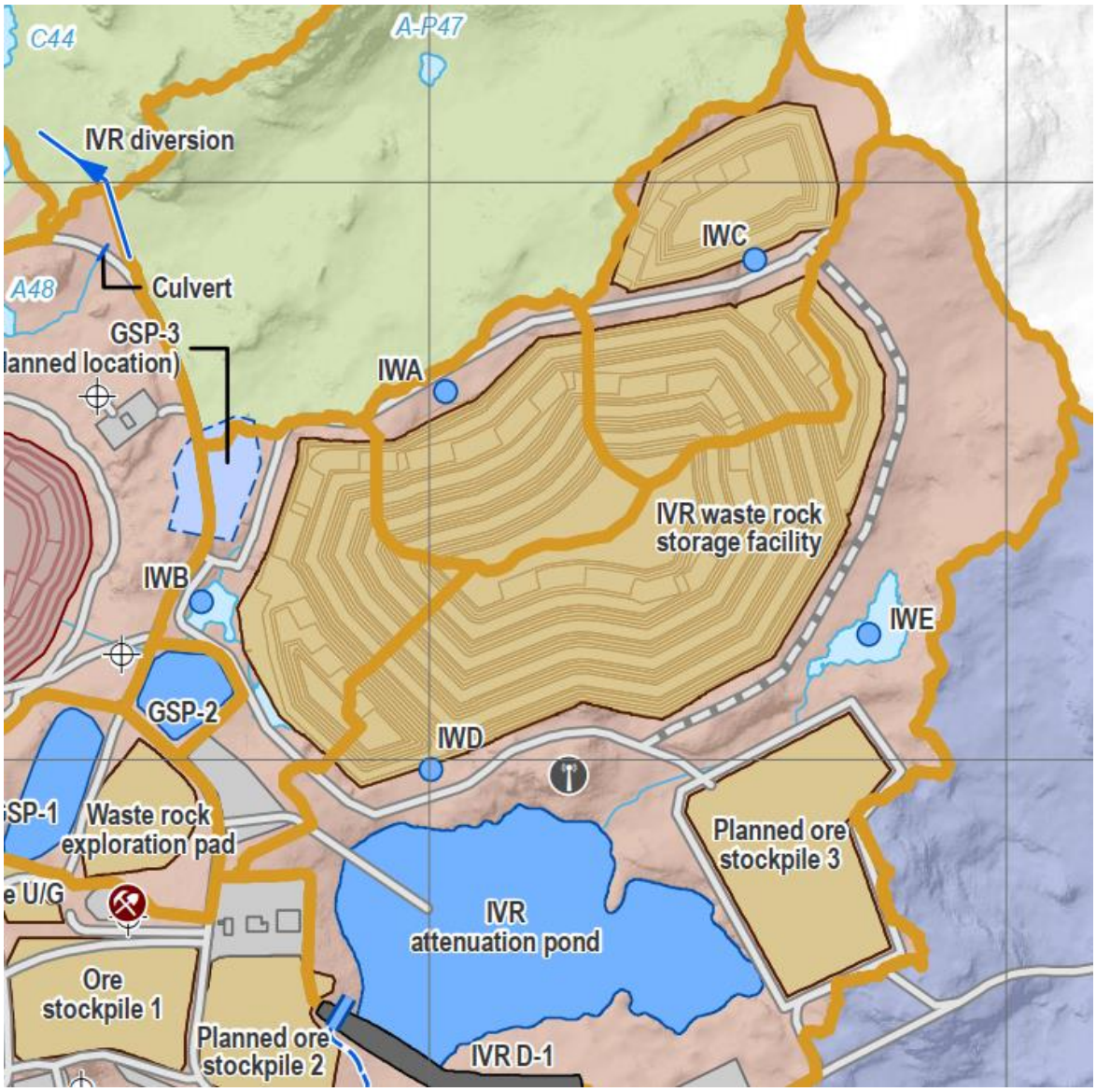


Figure 2-1:Plan View of IVR Sumps

3.0 Infrastructure Design

3.1 Design Criteria

The design criteria are based on the hydrological analysis results (SNCL, 2020) and the minimum volume required is designed to contain and manage the 1:100-Yr Spring Flood.

Table 3-1 presents the volume required of each sump.

Table 3-1: Volume Required for IVR WRSF Sumps

Sump	Required Volume (m^3)	Minimum pumping flowrate (m^3/h)
IWA	2,100	150
IWB	5,000	150
IWC	2,000	150
IWD (Note 1)	2,000	150

Note 1: Mobile pump installed at low point to evacuate water to IVR Att. Pond

3.2 Access Ramp and Pumping Pad

All the four (4) access ramps shall be built from the IVR WRSF ring road. The ring road shall have a depth of minimum 1 m from the existing terrain and shall be constructed with appropriate run-of-mine materials (0 to 1000 mm). The access ramps and pumping pads are designed to allow the installation of a containerized pump and/or the transportation of a trailer-mounted mobile pump.

The plan view and the section view of the ramps and pumping pads are documented in the drawing 61-695-230-212 (SNCL number 668284-7000-4GDD-0002) and are presented in Appendix 1. Table 3-2 summarizes the design parameters of the four (4) access ramps and pumping pads.

Table 3-2: Design Parameters of the Access Ramp and Pumping Pads

Parameter		Value	Unit
Access ramp start point elevation	IWA	El. 176.5	m
	IWB	El. 164.4	m
	IWC	El. 176	m
	IWD	El. 167.5	m
Pumping pad (end of the ramp) elevation	IWA	El. 175.6	m
	IWB	El. 162	m
	IWC	El. 175	m
	IWD	El. 165	m
Access ramp width		8	m
Safety berm Height		Per Mine Act requirement	m

Parameter	Value	Unit
Maximum slope	6	%
Pumping pad size	8 x 5	m x m

3.3 Pumping Stations

Pumping stations for IWA and IWB sumps shall be containerized diesel pump while pumping stations at IWC and IWD sumps shall be trailer-mounted mobile diesel pump skid. The pumps shall be Godwin Dri-Prime CD103M diesel powered pumps. The pump curve is presented Appendix 2. It is to be noted that at IWC and IWD, no permanent pumping station is required and thus trash pumps could be installed as an alternative solution.

The operating parameters of the pumping stations are presented in Table 3-3. It is to be noted that IWA and IWB sump pumps can be either operated at the same time or operated separately.

Table 3-3: Pump Models, Nominal & Maximum Flowrate and Expected Total Dynamic Head for IVR WRSF

Study Line No.	From	To	Material of Construction	Nominal Diameter (in)	Approximate Total Length (1) (m)	Maximum Water Level (2) (m)	Minimum Water Level (2) (m)	Maximum Flowrate (m^3/h)	Total Dynamic Head (m)	Motor Speed (RPM)	Pump model	Note
695-150-WFR-PC17-0117 695-200-WFR-PC17-0118	IWA Sump	IVR Attenuation Pond	HDPE DR17	6 & 8	1279	174	171	165 (LL) 169 (HH)	31 (LL) 31 (HH)	2000	CD103	Suction length 50 m
695-150-WFR-PC17-0120 695-200-WFR-PC17-0118	IWB Sump	IVR Attenuation Pond	HDPE DR17	8	521	164	161	150 (LL) 150 (HH)	10 (LL) 8 (HH)	1300 1200	CD103	Suction length 50 m, The valve requires partial closure to fit in the pump data range. Possibility to connect a second pump and achieve around 300 m^3/h
695-150-WFR-PC17-0122	IWC Sump	IVR Attenuation Pond (indirectly)	HDPE DR17	6	132	174	172	158 (LL) 166 (HH)	12 (LL) 12 (HH)	1400	CD103	Suction length 50 m The valve requires partial closure to fit in the pump data range.

3.4 Culverts

For the proposed configuration of the access roads within the sector of the IVR Attenuation Pond, the Ore Stockpile 3 and the IVR Waste Rock Storage Facility, a culvert system has to be set to convey the runoff volumes, that will be generated in the drainage area of IWE sump (former lake A54), into the IVR Attenuation Pond. A general location of the culvert is shown in the drawing 61-695-230-212 (SNCL number 668284-7000-4GDD-0002).

To design the culvert, the following criteria were taken into consideration:

- A culvert design to convey the runoff generated at the east sector of the IVR WRSF. The total drainage area was estimated to be approximately 27.6 ha.
- The peak flow for 1:100-Yr Flood was selected as the inflow design flow.
- The peak discharge was determined by applying the rational method, as recommended in MTQ (2014) for watersheds with areas of 25 km^2 or less. The method consists of applying the equation below using watershed characteristics and the I-D-F curves for the desired return period of 1:100-Yr:

  $$Q=CIA/360$$

  Where:

  Q: Peak discharge in m^3/s

  C: Peak discharge runoff coefficient

  I: Average rainfall intensity in mm/hr. This was determined based on the I-D-F curves and the watershed time of concentration.

  A: Watershed area in ha
- A runoff coefficient “C” of 1.0 was assumed due to the location of the mine in permafrost areas
- Intensity-Duration-Frequency (I-D-F) Data from Baker Station was used. This station, ID No. 2300500, is operated by Environment Canada (EC) and has I-D-F relationships available with 22 years of data from 1987 to 2009. These data were updated in the last version of the IDF- CC Tool, version 4 (from Western University) with additional data up to the year 2016. This data was adopted for the design of the culvert system
- Time of concertation was estimated based on Bransby William Formula as per recommendations in MTQ (2014) for “C”>0.4.
- The maximum flow estimated was approximately 1.63 m^3/s

The proposed culvert would be a corrugated steel pipe (CSP) assuming the following:

- Assuming projecting pipe from fill embankment of the access road.
- Circular corrugated steel pipe
- Manning "n" number: 0.024
- Assuming inlet control
- Culvert design at 0.85XDiameter capacity

3.4.1 Culvert Results

Table 3-4 summarized varies alternatives of number of pipes that would be required to pass the design inflow. The alternatives range from one (1) pipe to four (4) pipes with different diameter. For instance, a culvert system with three (3) CSPs of 800 mm diameter would be able to pass the design flow at partially full capacity (85% diameter). SNC-Lavalin understands that there are 900mm-pipes available at site, which can be used to replace the 800 mm pipes proposed for the design. This will provide a more conservative design for the culvert system.

Table 3-4: Culvert Results

1-Pipe	D:	1200	(mm)
2-Pipes	D:	1000	(mm)
3-Pipes	D:	800	(mm)
4-Pipes	D:	700	(mm)

4.0 Operation Description

During the phase 2 operation, all contact water from the IVR WRSF runoff shall be pumped to IVR Attenuation Pond.

Containerized and trailer-mounted mobile diesel pumps shall be installed on the pumping pad close to the sumps. The flowrate shall be adjusted manually by varying the operating speed of the diesel pump. When required, in order to ensure that the operating point of the pump stay within the pump curve, the discharge valve of the pump can be manually adjusted.

An operator shall inspect each pump station at least once a day.

The flowrate pumped from IVR WRSF sumps shall be monitored and recorded. The flowrate shall be estimated by pump speed and pressure readings. Pumping duration shall be recorded to calculate the total transferred water volume.

5.0 Installation Description

5.1 Construction Schedule

Construction of the IVR WRSF Pumping system is planned to take place in Q2 2021. Start-up and commissioning of the pumping system shall take place during the freshet/summer of 2021.

5.2 TSS Mitigation

To minimize TSS reporting to the surrounding ponds during the construction of the access roads and pumping pads, all of the ponds in the IVR WRSF permitted footprint used to store waste materials shall be dewatered prior to construction. The construction of the access roads and pumping pads shall be done under dry condition. If any water during construction is found to be high in TSS, it shall be transferred to the IVR Attenuation Pond per the Water License requirements.

To minimize TSS during phase 2 operation, intake pipe(s) shall be located at enough distance from the pumping pads and, to the extent possible, in areas with highest water depth. All suction cages of the pumps shall be installed at least 300 mm above the ground to limit sediment entrainment during pumping. The details are presented in Appendix 3.

5.3 Access Roads and Pumping Pad Material of Construction

The access road and pumping pad shall primarily be built of run-of-mine rockfill (0 to 1000 mm). The road and pad shall be covered with a 200 mm 0 to ¾" granular fill.

Only rockfill and granular fill that is Non-Potential Acid Generating (NPAG) and non-metal leaching (NML) shall be used for the construction of the access road and pumping pad outside of the footprint of the future IVR WRSF. The NPAG/NML rock shall be sourced from waste rock material from Whale Tail Pit or IVR Pit that has been tested in laboratory, per the latest protocols described in WT Operational ARD-ML Sampling and Testing Plan. Waste material is considered NPAG/NML when:

- It contains less than 0.1 wt.% total sulphur, regardless of its Neutralizing Potential (NP) value; and/or
- It contains more than 0.1 wt.% total sulphur, and the calculated carbonate Net Potential Ratio (NPR) value is greater than 2; and
- The average total arsenic < 75 ppm.

The same quality assurance/quality control (QA/QC) program currently in use at Meadowbank shall be used in the sample analysis of the waste materials from Whale Tail pit, which includes the use of certified reference materials and duplicate analyses by an accredited external laboratory.

5.4 Piping Installation

All of the piping being installed at the site shall be High-Density Polyethylene (HDPE). The HDPE pipe segments shall be assembled by butt fusion joints performed by a technician quality in this field according to Plastics Pipe Institute (PPI) TN-42 guidelines.

Once the installation is completed, a start-up test or service test shall be performed before operation. If the test section fails this test, the Contractor shall repair or replace all defective materials and/or labour at no additional cost to the Contractor.

For more details, please refer to the Pump and Piping General Installation Specifications that can be found in Appendix 4.

5.5 QA/QC Requirements

The quality assurance and quality control (QA/QC) program that shall be put in place during the construction of the access road and pumping pads and installation of the HDPE piping and pumps to ensure the following:

- NPAG rockfill material are properly assessed and identified for use in the construction of the access roads and pumping pad;
- Ensure proper compaction of the rockfill and granular fill material;
- Track the quantity of NPAG rockfill and granular fill used in the construction;

- Provide as-built drawings for the access road and pumping pads, including final elevations of the structures;
- Identify and place the proper diameter and HDPE DR rated pipeline at its proper location on the site;
- Verify qualifications of the field technician that is assembling the piping;
- Provide as-built drawings for the pipelines and pump location.
- Identify and ensure the proper diesel pumps are placed at the right location on site. Ensure proper diesel spill containment or spill kit are in place.

A detailed QA/QC program can be found in the Pump and Piping General Installation Specifications that are presented in Appendix 4.

The installation Contractor shall have to provide, at a minimum, the following documentations to confirm that the installation, commissioning and testing were properly completed:

- Test Plans (To be approved by AEM)
- Test Sheets (To be approved for each test perform)

These documents shall be submitted at the end of the project (Hand Over) by the Contractor.

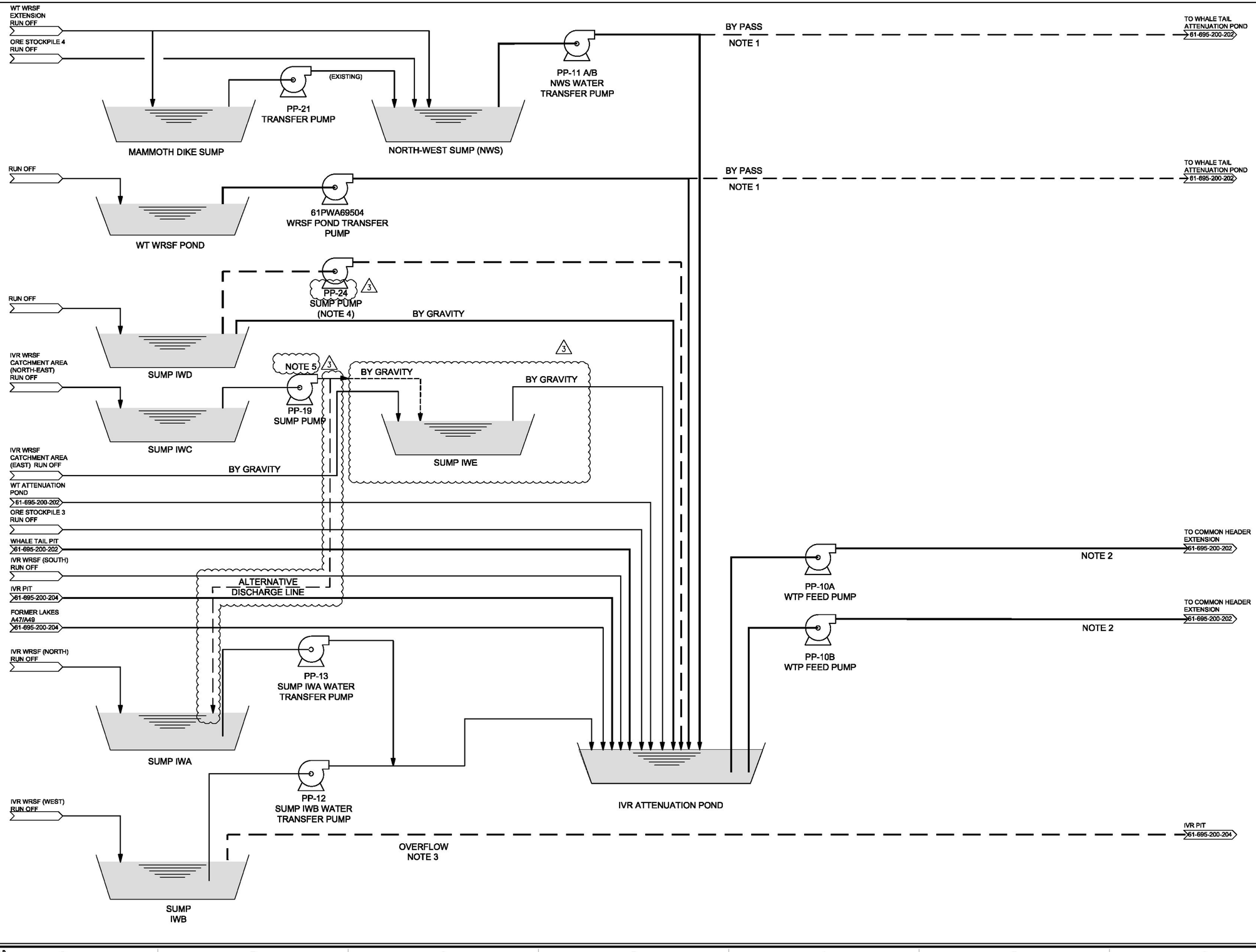
During phase 2 operation, the operation team shall ensure regular monitoring of the diesel pump operation, which includes monitoring of operating pressure, pump speed and operating time and monitoring for any diesel spill and water leaks along the pipeline.

Appendix 1: Drawings

61-695-200-203:	Phase 2 – Process Flow Diagram – Whale Tail WRSF & Extension, IVR WRSF & IVR Attenuation Pond
61-695-205-211:	Phase 2 – Process & Instrumentation Diagram – IVR WRSF and pumping stations
61-695-270-227:	Phase 2 – Piping Layout Amaruq Phase 2
61-695-270-218:	Phase 2 – Piping Layout and profile of IVR WRSF area
61-695-230-212:	Phase 2 – Plan View, Profiles and Typical Sections – Access ramps and pumping pads of IWA, IWB, IWC and IWD sumps

NO. DESSIN DRAWING NO. 61-695-200-203

FORMAT ARCH D



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PROJECT No	SUBDIVISION	SUBJECT	SERIAL	REV.
668284	6000	49, D1	0002	E03

NOTES GÉNÉRALES / GENERAL NOTES

NOTES :

1. BY-PASS USED TO SEND WATER TO WT ATTENUATION POND ONLY WHEN REQUIRED.
2. WATER FROM IVR ATTENUATION POND WILL BE SENT TO THE COMMON HEADER BEFORE ENTERING THE WTP.
3. OVERFLOW CAUSED BY EVENTS BEYOND DESIGN FLOOD WILL BE SENT TO IVR PIT.
4. PUMP REQUIRED AT STORM EVENTS WHEN WATER LEVEL IN IVR ATTENUATION POND IS HIGH.
5. WATER FROM IWC SUMP SHALL BE PUMPED WITHIN THE IVR WRSF WATERSHED AND FLOWS TO THE IVR ATTENUATION POND BY GRAVITY. ALTERNATIVELY, WATER FROM IWC SUMP CAN BE PUMPED TO IWA SUMP IF REQUIRED.

3

LEGEND:
- PRIMARY STREAM
- SECONDARY STREAM
- INTERMITTENT STREAM

DESSINS EN RÉFÉRENCE / REFERENCE DRAWINGS

TITRE / TITLE	# DWG

AGNICO EAGLE

R3	2021-01-27	ISSUED FOR CONSTRUCTION	D.C.	A.L.N.	
R2	2020-11-10	ISSUED FOR CONSTRUCTION	D.C.	A.L.N.	
R1	2020-09-03	ISSUED FOR CONSTRUCTION	D.C.	A.L.N.	
R0	2020-02-14	ISSUED FOR CONSTRUCTION	D.C.	A.L.N.	
RB	2020-01-07	CLIENT COMMENTS	D.C.	A.L.N.	
RA	2019-12-18	ISSUED FOR COMMENTS	D.C.	A.L.N.	
REV.	DATE	DESCRIPTION	PAR/BY	APP.	CLIENT

REVISIONS

PERMIT TO PRACTICE SNC-LAVALIN INC.
Signature NAME
Date DATE 2020-01-27
PERMIT NUMBER: P 260
The Association of Professional Engineers, Geologists and Geophysicists of NWT/NU

2021-01-27

TITRE / TITLE

AGNICO EAGLE – AMARUQ DIVISION
695 – WATER MANAGEMENT

200 – PROCESS FLOWSHEET
AMARUQ PHASE 2 OPERATION
WHALE TAIL WRSF & EXTENSION,
IVR WRSF & IVR ATTENUATION POND

DESSINÉ PAR DRAWN BY	M. MOVILA	DATE 2019-12-18
VÉRIFIÉ PAR CHECKED BY	D. CHEN	2019-12-18
APPROUVÉ PAR APPROVED BY	A.L. NGUYEN	2019-12-18
ÉCHELLE SCALE		DATE 2019-12-18

NO. DESSIN DRAWING NO. 61-695-200-203

NO. PROJET PROJECT NO.	REVISION	FEUILLE / SHT
6127	R3	1 / 1

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FILE NO. 61-695-200-203_R3.dwg

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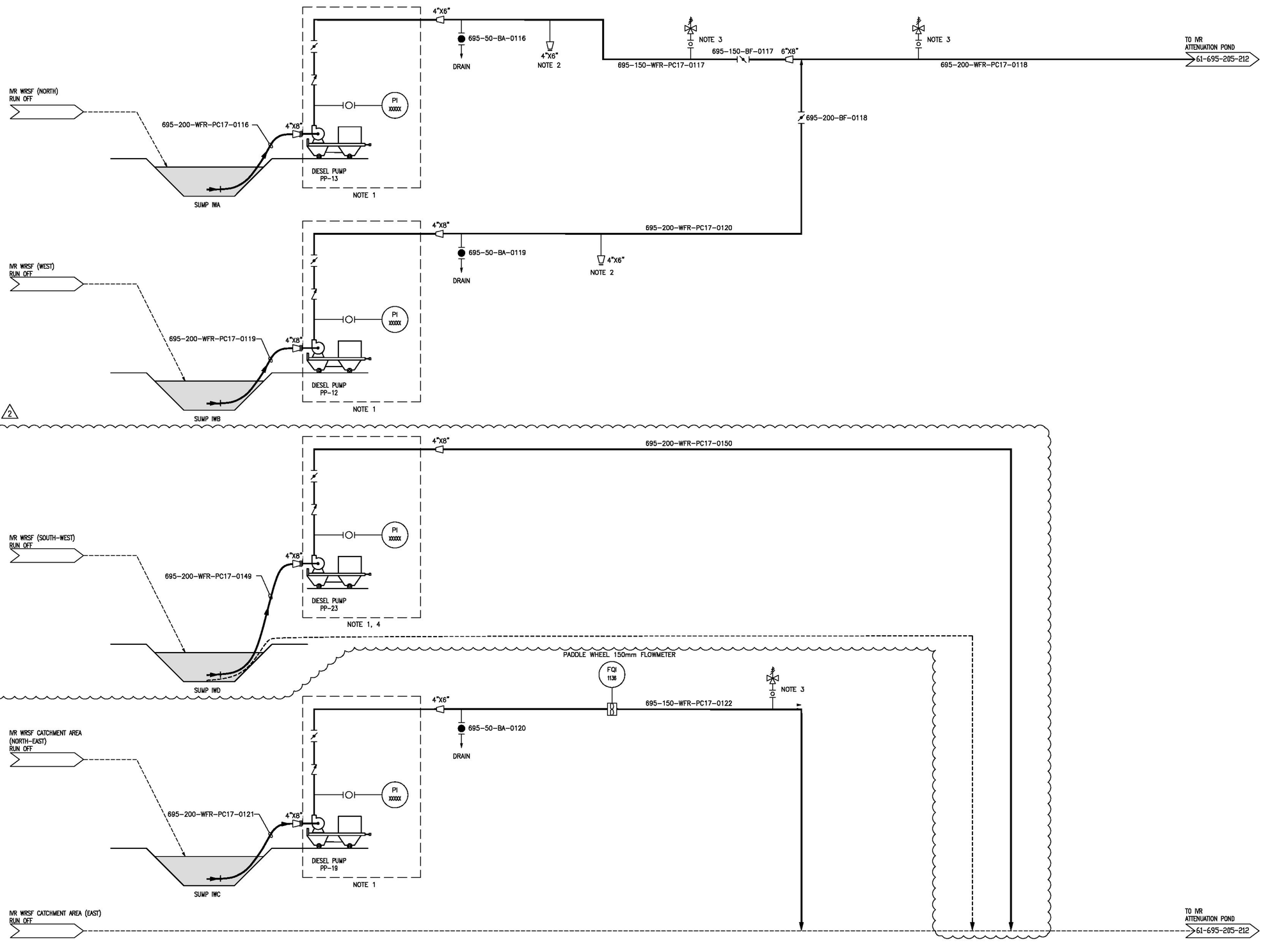

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PROJECT No	SUBDIVISION	SUBJECT	SERIAL	REV.
668284	6000	49 | D4	0005	E02

NOTES GÉNÉRALES / GENERAL NOTES

NOTES :

1. DIESEL PUMP MOUNTED ON A SKID.
2. SPARE TIE-INS FOR CONECTING A SECOND PUMP IF REQUIRED.
3. SEE PROFILE DRAWING 61-695-270-218 FOR THE NUMBER AND THE LOCATION OF AIR RELEASE/VACCUUM BREAKER VALVES REQUIRED.
4. PUMP REQUIRED AT STORM EVENTS WHEN WATER LEVEL IN IVR ATTENUATION POND IS HIGH.

LEGEND:

EXISTING LINE
NEW LINE
SURFACE RUNOFF
OTHER FLOW

DESSINS EN RÉFÉRENCE / REFERENCE DRAWINGS

TYPE / TITLE	# DWG

AGNICO EAGLE

REV.	DATE	DESCRIPTION	PAR/DR	APP.	CLIENT
R2	2020-11-10	ISSUED FOR CONSTRUCTION	D.C.	A.L.N.	
R1	2020-08-03	ISSUED FOR CONSTRUCTION	D.C.	A.L.N.	
R0	2020-05-06	ISSUED FOR CONSTRUCTION	D.C.	A.L.N.	
RB	2019-02-28	ISSUED FOR CLIENT COMMENTS	D.C.	A.L.N.	
RA	2020-01-06	ISSUED FOR COMMENTS	D.C.	A.L.N.	

REVISIONS

PERMIT TO PRACTICE
SNC-LAVALIN INC.
Signature NAME
Date DATE 2020-11-10
PERMIT NUMBER: P 260
The Association of Professional Engineers, Geologists and Geophysicists of NWT/NU

2020-11-10

TITRE / TITLE

AGNICO EAGLE – AMARUQ DIVISION
695 – WATER MANAGEMENT

205–PIPING AND INSTRUMENTATION DIAGRAM
AMARUQ PHASE 2 OPERATION
IVR WRSF & PUMPING STATIONS

DESSINÉ PAR / DRAWN BY	M. MOVILA	DATE 2020-01-06
VÉRIFIÉ PAR / CHECKED BY	D. CHEN	2020-01-06
APPROUVÉ PAR / APPROVED BY	A.L. NGUYEN	2020-01-06
ÉCHELLE / SCALE		DATE 2020-01-06

NO. DESSIN / DRAWING NO.
61-695-205-211

NO. PROJET / PROJECT NO.	REVISION	FEUILLE / SHT
6127	R2	1 / 1

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FILE NO. 61-695-205-211_R2.dwg

NO. DESSIN DRAWING NO. 61-695-270-227

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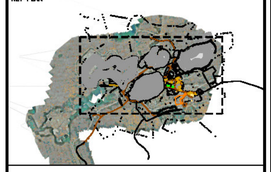

PROJECT No	SUBDIVISION	SUBJECT	SERIAL	REV.
668284	6000	46 | DD	0011	E03

NOTES GENERALES / GENERAL NOTES

NOTES

1. THE FOLLOWING DRAWING PROVIDES THE GENERAL ROUTING OF THE PIPELINE ON THE SITE. THEY CAN BE ADJUSTED BASED ON FIELD CONDITIONS. THE LINES SHOWN ARE NOT TO SCALE FOR CLARIFY PURPOSES.
2. THE DETAILS OF EACH PIPELINE PROFILE AND ROUTING ARE DESCRIBED IN INDIVIDUAL PROFILE DRAWINGS.
3. PIPES SHALL BE INSTALLED ON THE SAFETY BERM OF THE ORE STOCKPILE

LEGEND:

- 6" NOMINAL NON-INSULATED
- 8" NOMINAL NON-INSULATED
- 8" NOMINAL INSULATED AND HEAT TRACED
- 14" NOMINAL INSULATED AND HEAT TRACED
- 14" NOMINAL NON-INSULATED
- EXISTING PIPELINE
- NEW PIPELINE
- NEW CULVERT
- EXISTING CULVERT

DESSINS EN RÉFÉRENCE / REFERENCE DRAWINGS

TITRE / TITLE	# DWG

AGNICO EAGLE

REV.	DATE	DESCRIPTION	PAR/BY	APP.	CLIENT
R3	2020-12-22	ISSUED FOR CONSTRUCTION	ILA/BJC	A.L.N.	
R2	2020-11-10	ISSUED FOR CONSTRUCTION	ILA/BJC	A.L.N.	
R1	2020-09-02	ISSUED FOR CONSTRUCTION	ILA/BJC	A.L.N.	
R0	2020-08-20	ISSUED FOR CONSTRUCTION	ILA/BJC	A.L.N.	
R0	2020-08-11	ISSUED FOR CLIENT COMMENTS	ILA/BJC	A.L.N.	
RA	2020-07-16	ISSUED FOR INTERNAL COMMENTS	ILA/BJC	A.L.N.	

REVISIONS

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SNC-LAVALIN INC.
Signature NAME
Date DATE 2020 12 23
PERMIT NUMBER: P 260
The Association of Professional Engineers, Geologists and Geophysicists of NWT/NU

2020-12-23

TITRE / TITLE

AGNICO EAGLE – AMARUQ DIVISION
695 – WATER MANAGEMENT
270 – PIPING

AMARUQ PHASE 2
PIPE LAYOUT

DESSINÉ PAR DRAWN BY	MARIUS MOVILA	DATE 2020-03-11
VERIFIÉ PAR CHECKED BY	DAN CHEN	2020-03-11
APPROUVÉ PAR APPROVED BY	ANH-LONG NGUYEN	2020-03-11
ÉCHELLE SCALE	AS SHOWN	DATE 2020-03-11
NO. DESSIN DRAWING NO.	61-695-270-227	
NO. PROJET PROJECT NO.	6127	REVISION R3 / FEUILLE / SHT 1 / 1

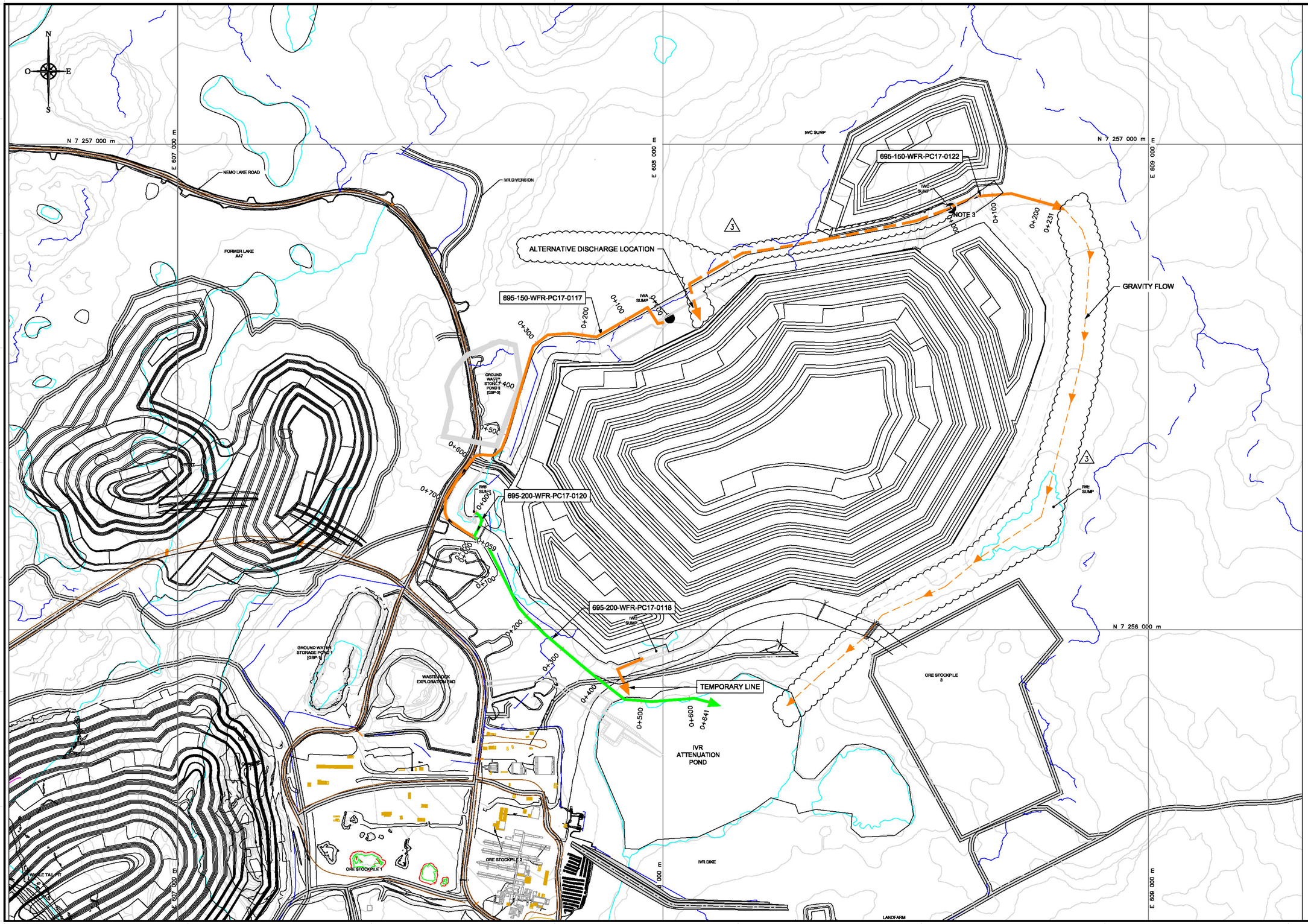
AE-CWT-ARCH D

T:\proj\668284 WMGI Phase 2 Detailed Engineering\40_DD_DESSINS\6000\668284-6000-46DD-0011-E03 (61-695-270-227).dwg

FILE NO.

NO. DESSIN DRAWING NO. 61-695-270-218

FORMAT ARCH D



PLAN CLÉ
KEY PLAN

PROJECT No	SUBDMSION	SUBJECT	SERIAL	REV.
668284	6000	48 | DD	0002	E03

NOTES GÉNÉRALES / GENERAL NOTES

NOTES

1. THE FOLLOWING DRAWING PROVIDES THE GENERAL ROUTING OF THE PIPELINE ON THE SITE. THEY CAN BE ADJUSTED BASED ON FIELD CONDITIONS. THE LINES SHOWN ARE NOT TO SCALE FOR CLARIFY PURPOSES.
2. A MOBILE PUMP AT IWD SUMP IS REQUIRED AT STORM EVENTS WHEN WATER LEVEL IN IVR ATTENUATION POND IS HIGH.
3. WATER FROM IWC SUMP SHALL BE PUMPED WITHIN THE IVR WRSF WATERSHED AND FLOWS TO THE IVR ATTENUATION POND BY GRAVITY. ALTERNATIVELY, WATER FROM IWC SUMP CAN BE PUMPED TO IWA SUMP IF REQUIRED.

LEGEND:

- 6" NOMINAL NON-INSULATED
- 8" NOMINAL NON-INSULATED

DESSINS EN RÉFÉRENCE / REFERENCE DRAWINGS

TITRE / TITLE	# DWG
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AGNICO EAGLE

REV.	DATE	DESCRIPTION	PAR/BY	APP.	CLIENT
R3	2021-01-27	ISSUED FOR CONSTRUCTION	M.M.	A.L.N.	A.L.
R2	2020-12-23	ISSUED FOR CONSTRUCTION	M.M.	A.L.N.	A.L.
R1	2020-11-10	ISSUED FOR CONSTRUCTION	M.M.	A.L.N.	A.L.
R0	2020-08-02	ISSUED FOR CONSTRUCTION	M.M.	A.L.N.	A.L.
RB	2020-04-23	ISSUED FOR CLIENT COMMENTS	M.M.	A.L.N.	A.L.
RA	2020-03-10	ISSUED FOR INTERNAL COMMENTS	M.M.	A.L.N.	A.L.

REVISIONS

PERMIT TO PRACTICE
SNC-LAVALIN INC.
Signature NAME
Date DATE 2020.01.27
PERMIT NUMBER: P 260
The Association of Professional Engineers, Geologists and Geophysicists of NWT/NU
2021-01-27

TITRE / TITLE

AGNICO EAGLE – AMARUQ DIVISION
695 – WATER MANAGEMENT
270 – PIPING

AMARUQ PHASE 2
PIPE LAYOUT AND PROFILE OF IVR WRSF AREA

DESSINÉ PAR DRAWN BY	MARIUS MOVILA	DATE 200-03-11
VÉRIFIÉ PAR CHECKED BY	ANH-LONG NGUYEN	200-03-11
APPROUVÉ PAR APPROVED BY	ALEXANDRE LAVALLÉE	200-03-11
ÉCHELLE SCALE	AS SHOWN	DATE 200-03-11

NO. DESSIN DRAWING NO. 61-695-270-218

NO. PROJET PROJECT NO.	REVISION	FEUILLE / SHT
6127	R3	1 / 2

AE-CART-ARCH D

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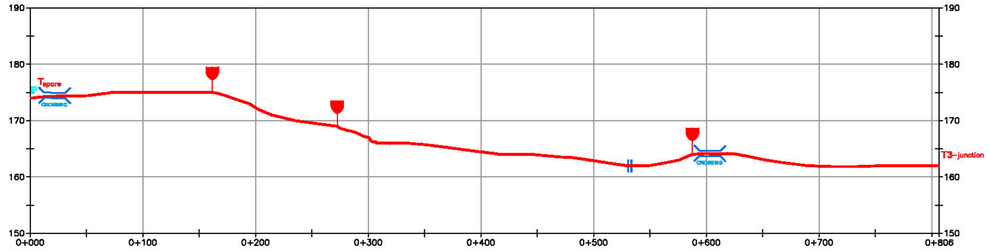
FILE NO.

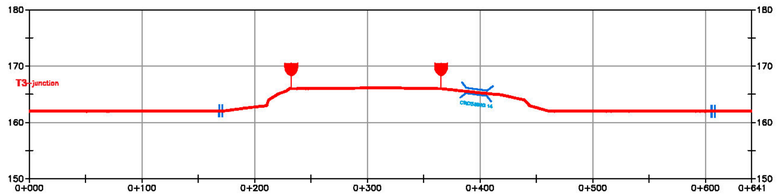
NO. DESSIN
DRAWING NO. 61-695-270-218

FORMAT ARCH D



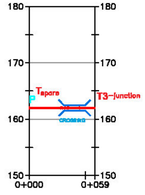
LINE 695-150-WFR-PC17-0117 FROM IWA SUMP TO TEE AT IWB SUMP

SCALE: HORIZONTAL 1:2500
VERTICAL 1:500



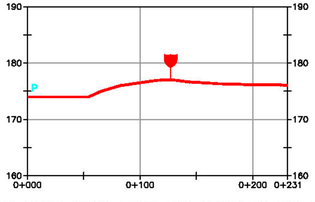
LINE 695-200-WFR-PC17-0118 FROM TEE AT IWB SUMP TO IVR ATTENUATION POND

SCALE: HORIZONTAL 1:2500
VERTICAL 1:500



LINE 695-200-WFR-PC17-0120 FROM IWB SUMP TO TEE AT IWB SUMP

SCALE: HORIZONTAL 1:2500
VERTICAL 1:500



LINE 695-150-WFR-PC17-0122 FROM IWC SUMP TO IVR ATTENUATION POND

SCALE: HORIZONTAL 1:2500
VERTICAL 1:500

PLAN CLÉ
KEY PLAN

PROJECT No	SUBDMSION	SUBJECT		SERIAL	REV.
668284	6000	48	DD	0002	E03

NOTES GÉNÉRALES / GENERAL NOTES

LEGEND:

- COMBINATION AIR VALVE VACUUM BREAKER/AIR RELEASE
- FLANGE
- T_{spare} SPARE TEE
- T_{pig} PIGGING TEE
- P PUMP
- CULVERT

DESSINS EN RÉFÉRENCE / REFERENCE DRAWINGS

TITRE / TITLE	# DWG
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AGNICO EAGLE

REV.	DATE	DESCRIPTION	PAR/BY	APP.	CLIENT
R3	2021-01-27	ISSUED FOR CONSTRUCTION	M.M.	A.L.N.	A.L.
R2	2020-12-23	ISSUED FOR CONSTRUCTION	M.M.	A.L.N.	A.L.
R1	2020-11-10	ISSUED FOR CONSTRUCTION	M.M.	A.L.N.	A.L.
R0	2020-08-02	ISSUED FOR CONSTRUCTION	M.M.	A.L.N.	A.L.
RB	2020-04-23	ISSUED FOR CLIENT COMMENTS	M.M.	A.L.N.	A.L.
RA	2020-03-10	ISSUED FOR INTERNAL COMMENTS	M.M.	A.L.N.	A.L.

REVISIONS

PERMIT TO PRACTICE
SNC-LAVALIN INC.
Signature NAME
Date DATE 2020-01-27
PERMIT NUMBER: P 260
The Association of Professional Engineers, Geologists and Geophysicists of NWT/NU

2021-01-27

TITRE / TITLE

AGNICO EAGLE – AMARUQ DIVISION
695 – WATER MANAGEMENT
270 – PIPING

AMARUQ PHASE 2
PIPE LAYOUT AND PROFILE OF IVR WRSF AREA

DESSINÉ PAR DRAWN BY	MARIUS MOVILA	DATE 200-03-11
VERIFIÉ PAR CHECKED BY	ANH-LONG NGUYEN	200-03-11
APPROUVÉ PAR APPROVED BY	ALEXANDRE LAVALLÉE	200-03-11
ÉCHELLE SCALE	AS SHOWN	DATE 200-03-11

NO. DESSIN
DRAWING NO. 61-695-270-218

NO. PROJET PROJECT NO.	REVISION	FEUILLE / SHT
6127	R3	2 / 2

AE-CART-ARCH D

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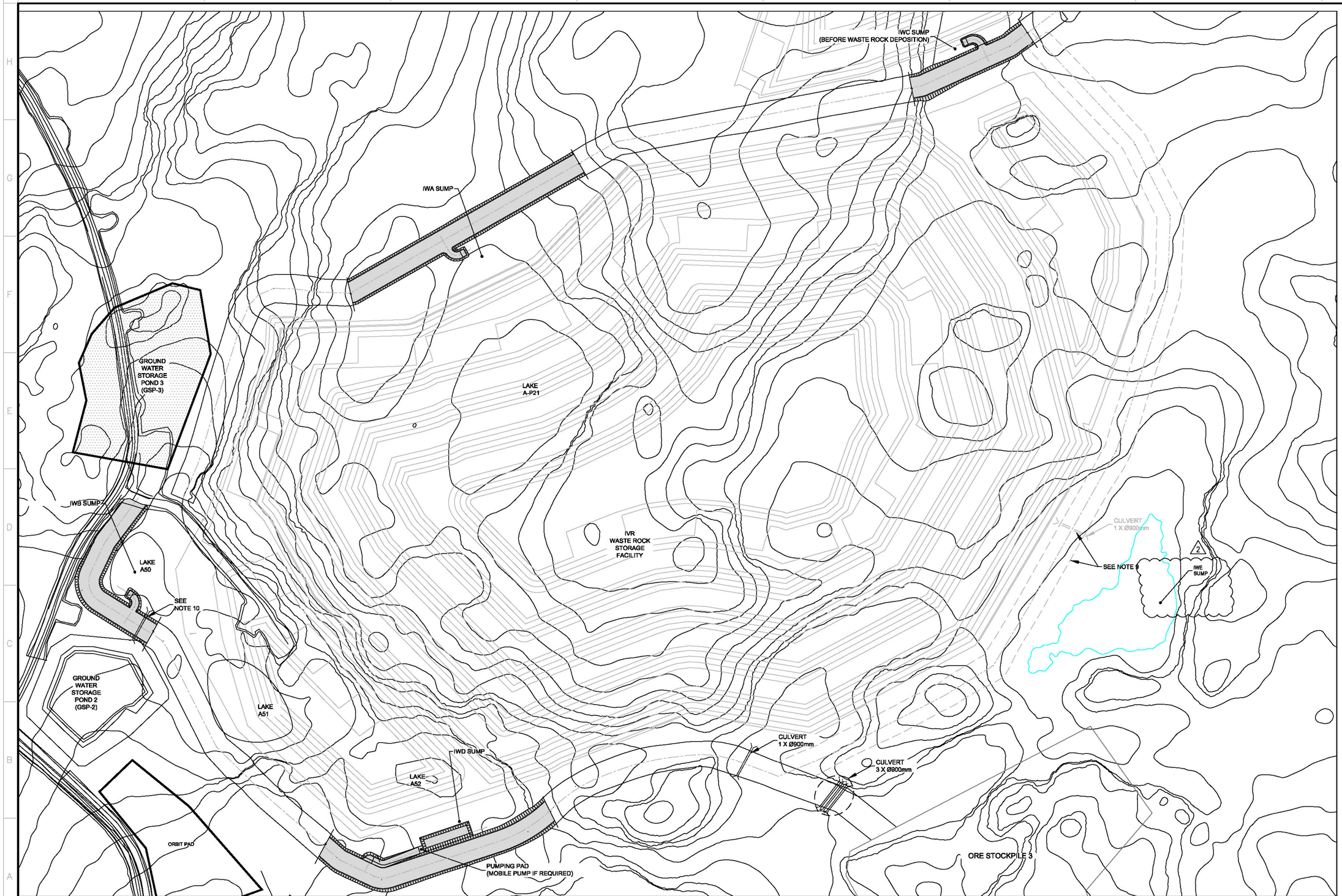
FILE NO.

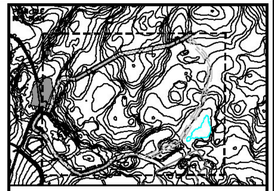
NO. DESSIN
DRAWING NO. 61-695-230-212

FORMAT ARCH D



PLAN VIEW
ACCES RAMPS AND PUMPING PADS OF IWA, IWB, IWC AND IWD SUMPS

SCALE : 1: 2000



PROJECT No	SUBDIVISION	SUBJECT	SERIAL	REV.
668284	7000	4G | DD	0002	E02

NOTES GÉNÉRALES / GENERAL NOTES

NOTES:
1. GROUND TOPOGRAPHY WAS PROVIDED BY AEM.
2. ALL UNITS ARE IN METERS.
3. SAFETY BERMS SHALL BE BASED ON THE MINE SAFETY ACT REQUIREMENTS.
4. STABILITY OF THE RAMPS TO BE ASSESSED ON A DAILY BASIS BY QUALIFIED PERSONNEL DURING CONSTRUCTION. WORK SHALL BE SUSPENDED IF SIGNS OF INSTABILITY ARE OBSERVED.
5. INITIAL ROCK FILL MATERIAL PLACEMENT IN WATER, AGAINST THE NATURAL SOIL OF THE LAKE, MUST BE PLACED USING A SHOVAL.
6. FOR ALL ROCK FILL PLACEMENT OVER WATER, SOME FOUNDATION PREPARATION MIGHT BE NEEDED DEPENDING ON NATURE AND THICKNESS OF SEDIMENT ENCOUNTERED.
7. IWC SUMP IS REQUIRED INITIALLY WHEN THE WASTE ROCK DEPOSITION IN THE NORTH SECTOR OF THE IVR WRSF IS NOT DEVELOPPED.
8. THE FOOTPRINT OF THE RING ROAD IS PRELIMINARILY PROPOSED WITH TYPICAL ROAD WIDTH OF 30M AT THE TOE OF THE SLOPE. THE CONSTRUCTION OF THE RING ROAD SHALL BE FIELD ADJUSTED AND AT LEAST 10 m FROM THE WASTE ROCK STOCKPILE.
9. THE SOUTH-EAST SECTION OF THE RING ROAD AND CULVERTS SHALL BE CONSTRUCTED AND INSTALLED IF REQUIRED.
10. A CULVERT CAN BE INSTALLED IF REQUIRED

LEGEND:

DESSINS EN RÉFÉRENCE / REFERENCE DRAWINGS

TITRE / TITLE	# DWG
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AGNICO EAGLE

REV.	DATE	DESCRIPTION	PAR/BY	APP.	CLIENT
R2	2021-01-27	ISSUED FOR CONSTRUCTION	MM/DC	ALN/NB	
R1	2020-12-22	ISSUED FOR CONSTRUCTION	MM/DC	ALN/NB	
R0	2020-11-10	ISSUED FOR CONSTRUCTION	MM/DC	ALN/NB	
RC	2020-11-06	ISSUED FOR CLIENT COMMENTS	MM/DC	ALN/NB	
RB	2020-10-21	ISSUED FOR CLIENT COMMENTS	MM/DC	ALN/NB	
RA	2020-09-16	ISSUED FOR INTERNAL COMMENTS	MM/DC	ALN	

REVISIONS

PERMIT TO PRACTICE
SNC-LAVALIN INC.
Signature NAME
Date DATE 2020.01.27
PERMIT NUMBER: P 260
The Association of Professional Engineers, Geologists and Geophysicists of NWT/NU

2021-01-27

TITRE / TITLE

230 – GENERAL EARTHWORKS
270 – PIPING

PLAN VIEW, PROFILES AND TYPICAL SECTIONS

AMARUQ PHASE 2
ACCES RAMPS AND PUMPING PADS
OF IWA, IWB, IWC AND IWD SUMPS

DESSINÉ PAR / DRAWN BY	MARIUS MOVILA	DATE 2020-09-16
VERIFIÉ PAR / CHECKED BY	DAN CHEN	2020-09-16
APPROUVÉ PAR / APPROVED BY	ANH-LONG NGUYEN	2020-09-16
ÉCHELLE / SCALE	1:2000	DATE 2020-09-16

NO. DESSIN / DRAWING NO. 61-695-230-212

NO. PROJET / PROJECT NO.	REVISION	FEUILLE / SHT
6127	R2	1 / 3

AE-CART-ARCH D

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FILE NO.

NO. DESSIN
DRAWING NO. 61-695-230-212

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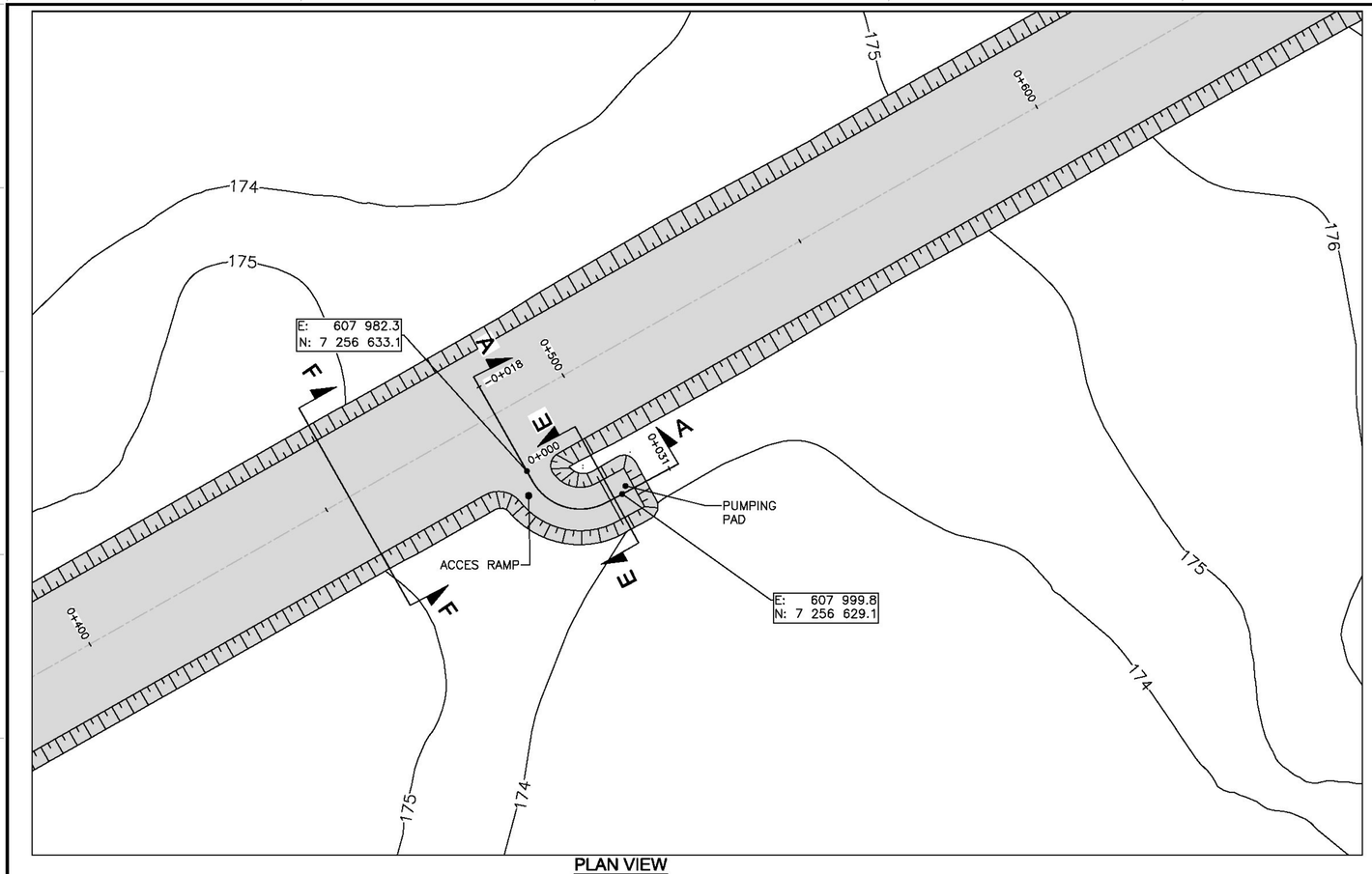
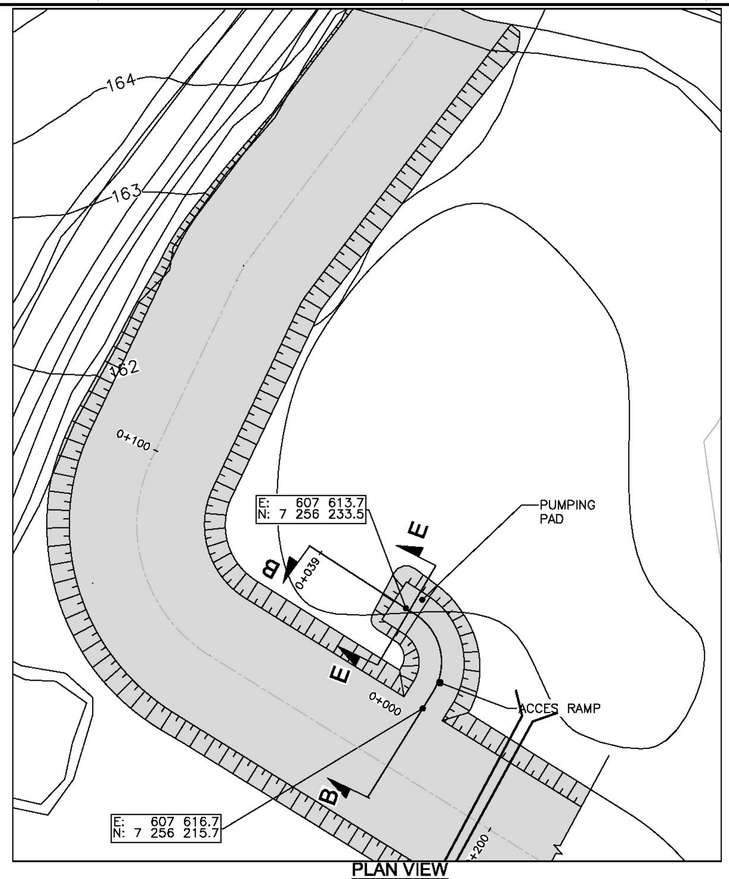
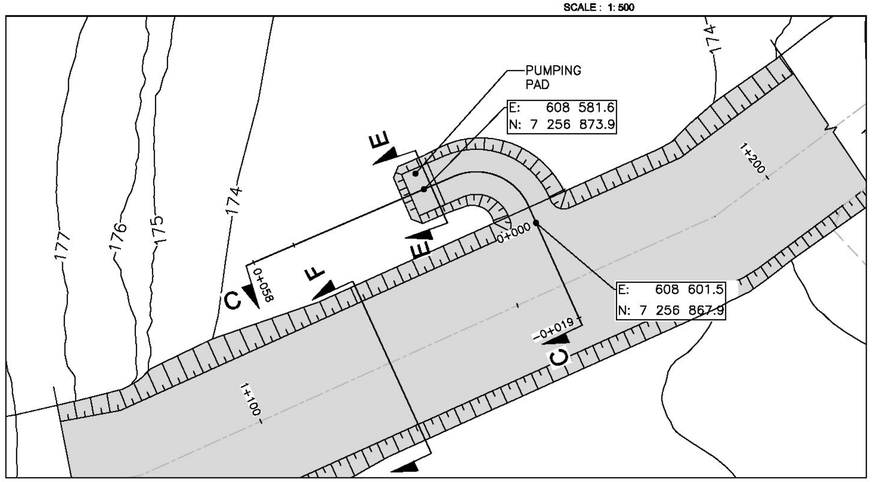


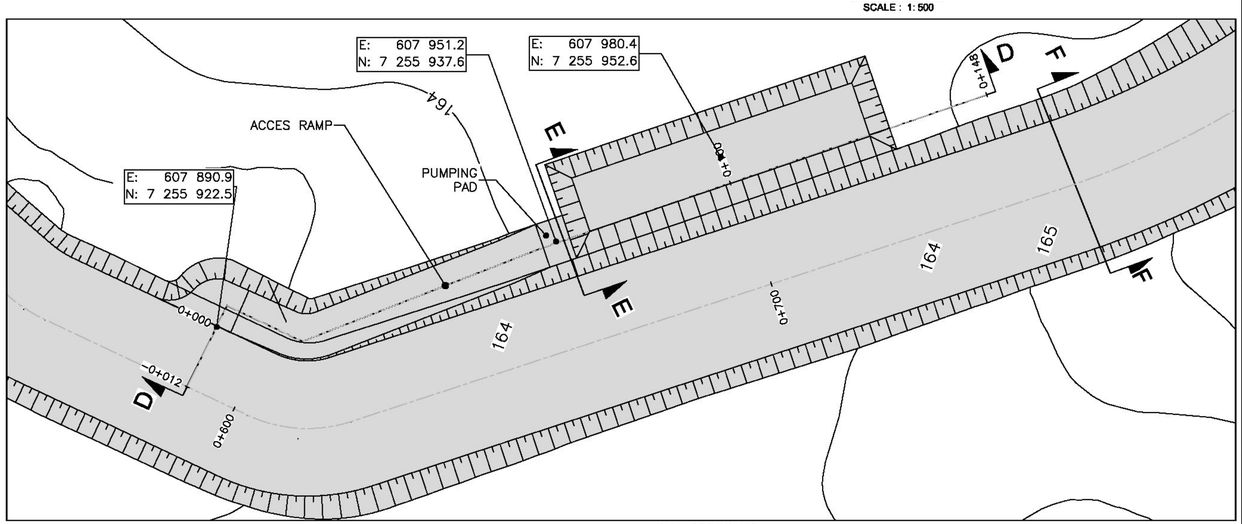
PLAN VIEW
ACCESS RAMP AND PUMPING PAD
IWA SUMP
SCALE : 1: 500



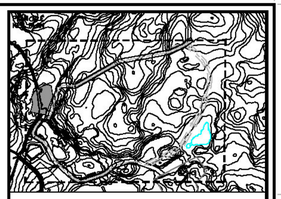
PLAN VIEW
ACCESS RAMP AND PUMPING PAD
IWB SUMP
SCALE : 1: 500



PLAN VIEW
ACCESS RAMP AND PUMPING PAD
IWC SUMP
SCALE : 1: 500



PLAN VIEW
ACCESS RAMP AND PUMPING PAD
IWD SUMP
SCALE : 1: 500



PROJECT No	SUBDIVISION	SUBJECT	SERIAL	REV.
668284	7000	4G | DD	0002	E02

NOTES GÉNÉRALES / GENERAL NOTES

NOTES
1. GROUND TOPOGRAPHY WAS PROVIDED BY AEM.
2. ALL UNITS ARE IN METERS.
3. SAFETY BERMS SHALL BE BASED ON THE MINE SAFETY ACT REQUIREMENTS.
4. STABILITY OF THE RAMPS TO BE ASSESSED ON A DAILY BASIS BY QUALIFIED PERSONNEL DURING CONSTRUCTION. WORK SHALL BE SUSPENDED IF SIGNS OF INSTABILITY ARE OBSERVED.
5. INITIAL ROCK FILL MATERIAL PLACEMENT IN WATER, AGAINST THE NATURAL SOIL OF THE LAKE, MUST BE PLACED USING A SHOVAL.
6. FOR ALL ROCK FILL PLACEMENT OVER WATER, SOME FOUNDATION PREPARATION MIGHT BE NEEDED DEPENDING ON NATURE AND THICKNESS OF SEDIMENT ENCOUNTERED.
7. FINAL RING ROAD FOOTPRINT AND ELEVATION SHALL BE DETERMINED BY AEM. ONLY APPROXIMATE VALUES ARE PROPOSED IN THIS DRAWING.

LEGEND:

DESSINS EN RÉFÉRENCE / REFERENCE DRAWINGS

TITRE / TITLE	# DWG
-	-
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-	-

AGNICO EAGLE

REV.	DATE	DESCRIPTION	PAR/BY	APP.	CLIENT
R2	2021-01-27	ISSUED FOR CONSTRUCTION	MM/DC	ALN/NB	
R1	2020-12-22	ISSUED FOR CONSTRUCTION	MM/DC	ALN/NB	
R0	2020-11-10	ISSUED FOR CONSTRUCTION	MM/DC	ALN/NB	
RC	2020-11-04	ISSUED FOR CLIENT COMMENTS	MM/DC	ALN/NB	
RB	2020-10-21	ISSUED FOR CLIENT COMMENTS	MM/DC	ALN/NB	
RA	2020-09-16	ISSUED FOR INTERNAL COMMENTS	MM/DC	ALN	

REVISIONS

PERMIT TO PRACTICE
SNC-LAVALIN INC.
Signature NAME
Date DATE 2020-01-27
PERMIT NUMBER: P 260
The Association of Professional Engineers, Geologists and Geophysicists of NWT/NU
2021-01-27

TITRE / TITLE
230 – GENERAL EARTHWORKS
270 – PIPING
PLAN VIEW, PROFILES AND TYPICAL SECTIONS
AMARUQ PHASE 2
ACCES RAMPS AND PUMPING PADS OF IWA, IWB, IWC AND IWD SUMPS

DESSINÉ PAR / DRAWN BY	MARIUS MOMILA	DATE 2020-09-16
VÉRIFIÉ PAR / CHECKED BY	DAN CHEN	2020-09-16
APPROUVÉ PAR / APPROVED BY	ANH-LONG NGUYEN	2020-09-16
ÉCHELLE / SCALE	1:2000	DATE 2020-09-16
NO. DESSIN / DRAWING NO.	61-695-230-212	
NO. PROJET / PROJECT NO.	6127	REVISION R2
FEUILLE / SHT	2 / 3	

AE-CANT-ARCH D

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FILE NO.

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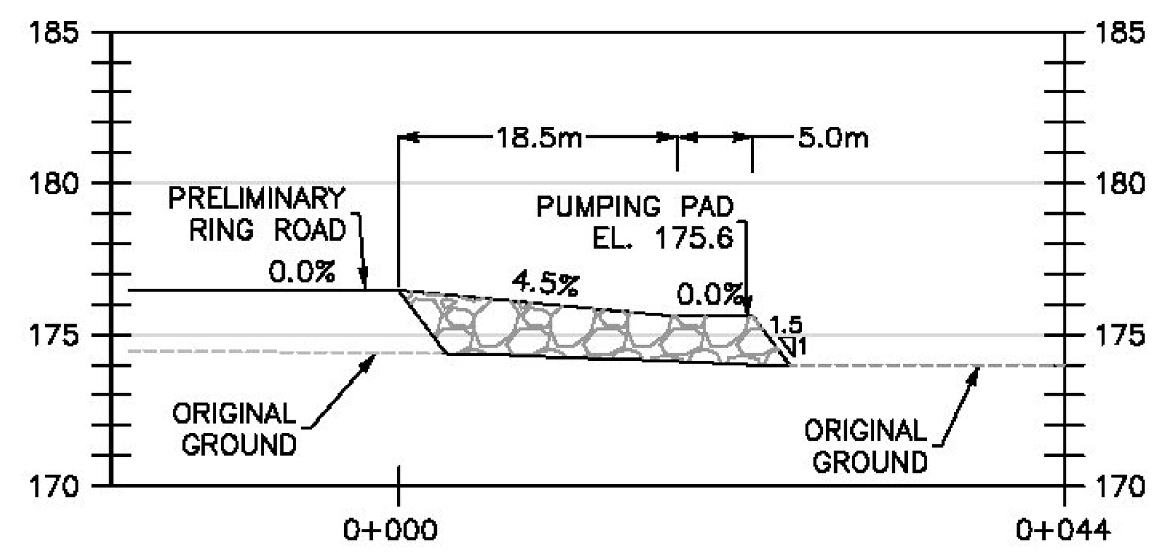
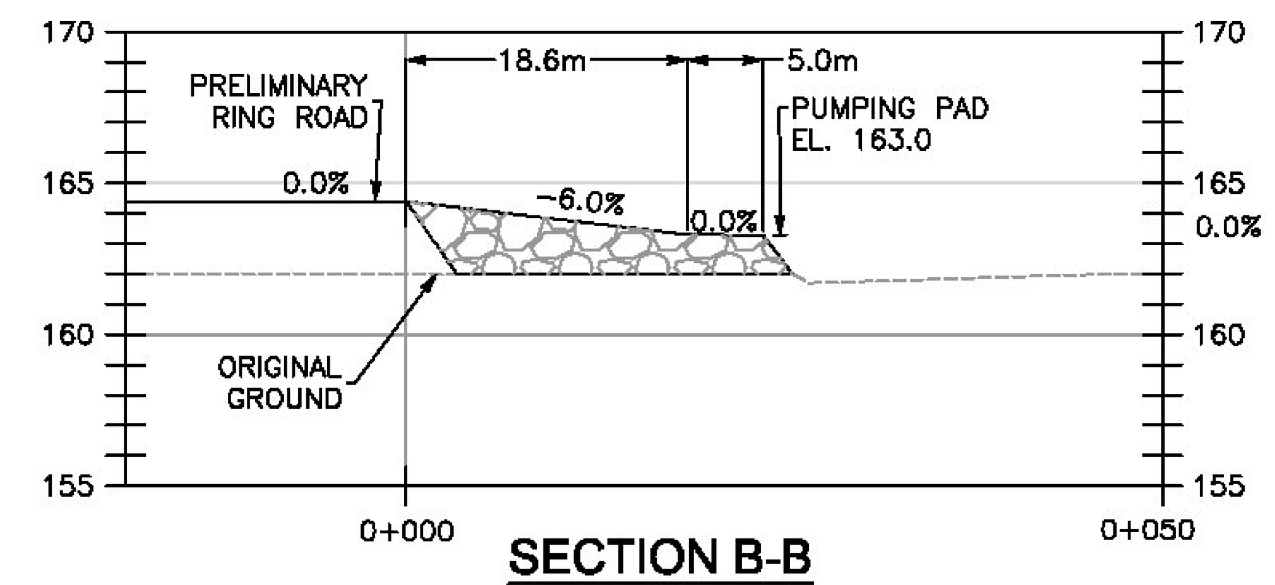


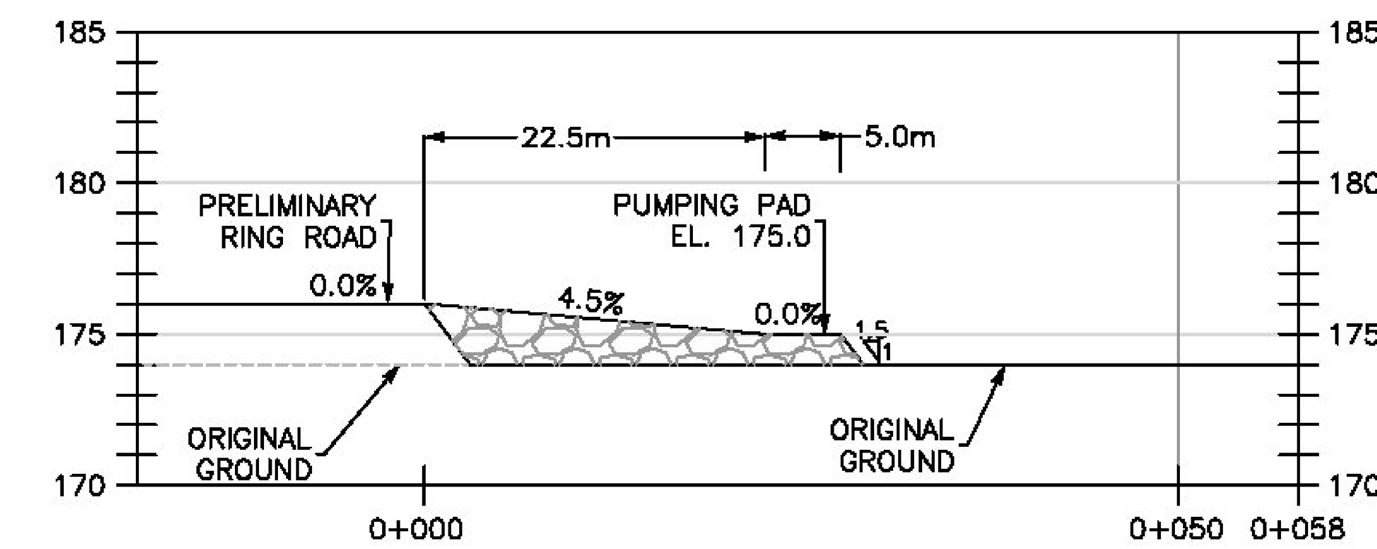
SECTION A-A

SCALE : H 1:500
V 1:250



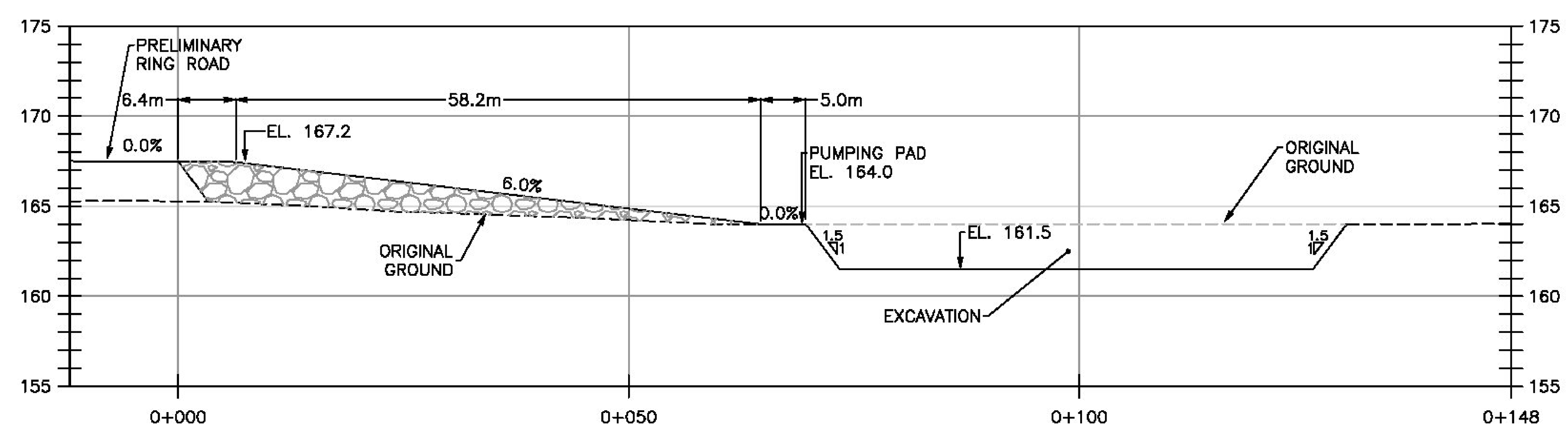
SECTION B-B

SCALE : H 1:500
V 1:250



SECTION C-C

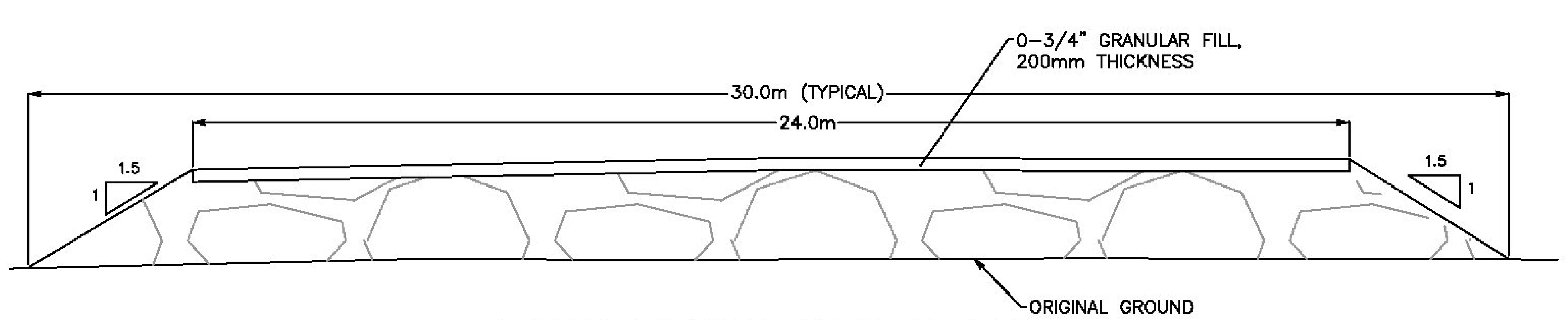
SCALE : H 1:500
V 1:250



SECTION D-D

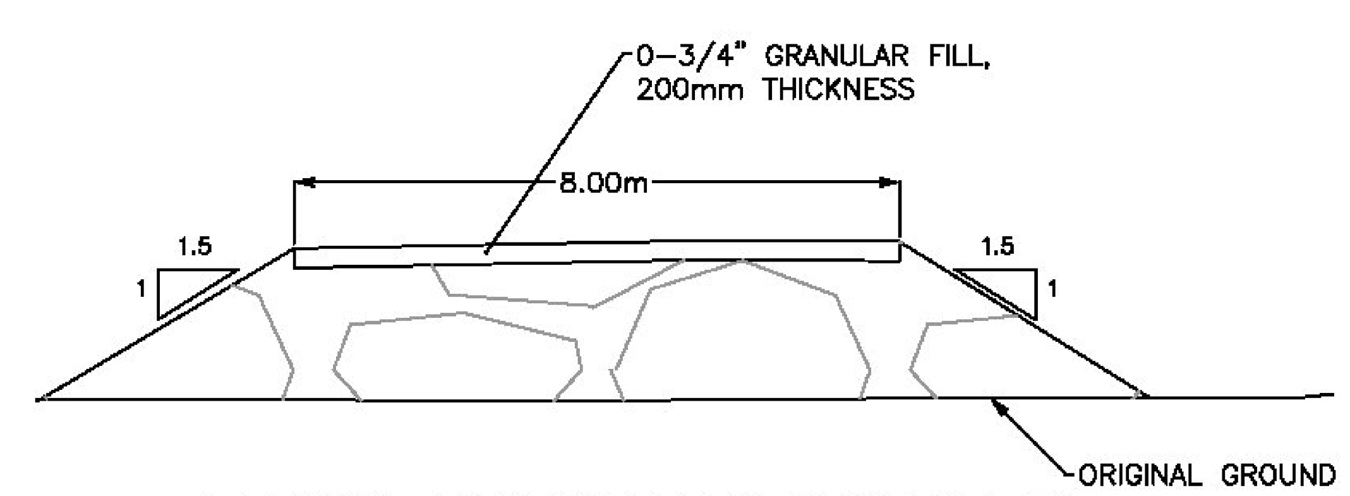
SCALE : H 1:500
V 1:250

ESTIMATED IN-PLACE QUANTITIES		
CONSTRUCTION – ACCES RAMPS AND PUMPING PADS OF IWA SUMP		
AGGREGATE MATERIAL	Thickness (mm)	Required (m^3)
Granular fill, 0 – 3/4" (final grade)	200	39.0
ROM, 0–1000 mm.	–	307.0
CONSTRUCTION – ACCES RAMPS AND PUMPING PADS OF IWB SUMP		
AGGREGATE MATERIAL	Thickness (mm)	Required (m^3)
Granular fill, 0 – 3/4" (final grade)	200	37.7
ROM, 0–1000 mm.	–	292.2
CONSTRUCTION – ACCES RAMPS AND PUMPING PADS OF IWC SUMP		
AGGREGATE MATERIAL	Thickness (mm)	Required (m^3)
Granular fill, 0 – 3/4" (final grade)	200	44.4
ROM, 0–1000 mm.	–	326.6
CONSTRUCTION – ACCES RAMPS AND PUMPING PADS OF IWD SUMP		
AGGREGATE MATERIAL	Thickness (mm)	Required (m^3)
Granular fill, 0 – 3/4" (final grade)	200	115.1
ROM, 0–1000 mm.	–	612.9



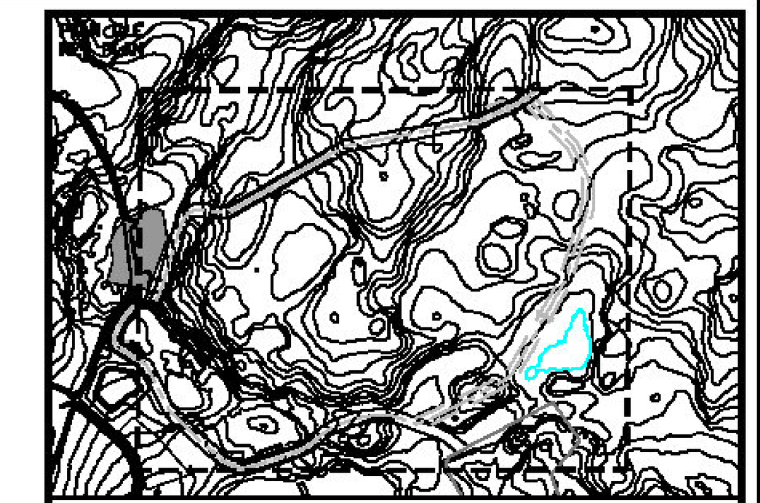
TYPICAL RING ROAD SECTION F-F

SCALE : 1: 100



TYPICAL ACCESS RAMP SECTION E-E

SCALE : 1: 100



PROJECT No	SUBDIVISION	SUBJECT	SERIAL	REV.
668284	7000	4G DD	0002	E02

NOTES GÉNÉRALES / GENERAL NOTES

NOTES
1. GROUND TOPOGRAPHY WAS PROVIDED BY AEM.
2. ALL UNITS ARE IN METERS.
3. SAFETY BERMS SHALL BE BASED ON THE MINE SAFETY ACT REQUIREMENTS.
4. STABILITY OF THE RAMPS TO BE ASSESSED ON A DAILY BASIS BY QUALIFIED PERSONNEL DURING CONSTRUCTION. WORK SHALL BE SUSPENDED IF SIGNS OF INSTABILITY ARE OBSERVED.
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6. FOR ALL ROCK FILL PLACEMENT OVER WATER, SOME FOUNDATION PREPARATION MIGHT BE NEEDED DEPENDING ON NATURE AND THICKNESS OF SEDIMENT ENCOUNTERED.
7. FINAL RING ROAD FOOTPRINT AND ELEVATION SHALL BE DETERMINED BY AEM. ONLY APPROXIMATE VALUES ARE PROPOSED IN THIS DRAWING.

LEGEND

RUN-OF-MINE ROCKFILL 0–1000 MM

DESSINS EN RÉFÉRENCE / REFERENCE DRAWINGS

TITRE / TITLE	# DWG

AGNICO EAGLE

REV.	DATE	DESCRIPTION	PAR/BY	APP.	CLIENT
R2	2021-01-27	ISSUED FOR CONSTRUCTION	MM/DC	ALN/HB	
R1	2020-12-22	ISSUED FOR CONSTRUCTION	MM/DC	ALN/HB	
R0	2020-11-10	ISSUED FOR CONSTRUCTION	MM/DC	ALN/HB	
RC	2020-11-06	ISSUED FOR CLIENT COMMENTS	MM/DC	ALN/HB	
RB	2020-10-21	ISSUED FOR CLIENT COMMENTS	MM/DC	ALN/HB	
RA	2020-09-16	ISSUED FOR INTERNAL COMMENTS	MM/DC	ALN	

REVISIONS

REGISTERED PROFESSIONAL ENGINEER A.-L. NGUYEN LICENSEE NT/NU 2021-01-27

PERMIT TO PRACTICE
SNC-LAVALIN INC.
Signature NAME
Date DATE 2020-01-27
PERMIT NUMBER: P 260
The Association of Professional Engineers, Geologists and Geophysicists of NWT/NU

TITRE / TITLE
230 – GENERAL EARTHWORKS
270 – PIPING

PLAN VIEW, PROFILES AND TYPICAL SECTIONS

AMARUQ PHASE 2
ACCES RAMPS AND PUMPING PADS OF IWA, IWB, IWC AND IWD SUMPS

DESSINÉ PAR / DRAWN BY	MARIUS MOVILA	DATE 2020-09-16
VÉRIFIÉ PAR / CHECKED BY	DAN CHEN	2020-09-16
APPROUVÉ PAR / APPROVED BY	ANH-LONG NGUYEN	2020-09-16
ÉCHELLE / SCALE	1:2000	DATE 2020-09-16

NO. DESSIN / DRAWING NO. 61-695-230-212

NO. PROJET / PROJECT NO.	REVISION	FEUILLE / SHT
6127	R2	3 / 3

FILE NO.

Appendix 2: Pump Curve Data

Godwin Dri-Prime Pumps – CD103M

CD103M Dri-Prime® Pump

The Godwin Dri-Prime CD103M pump offers flow rates to 1020 USGPM and has the capability of handling solids up to 3.0" in diameter.

The CD103M is able to automatically prime to 28' of suction lift from dry. Automatic or manual starting/stopping available through integral mounted control panel or optional wireless-remote access.

Indefinite dry-running is no problem due to the unique Godwin liquid bath mechanical seal design. Solids handling, dry-running, and portability make the CD103M the perfect choice for dewatering and bypass applications.

Features and Benefits

- Simple maintenance normally limited to checking fluid levels and filters.
- Dri-Prime (continuously operated Venturi air ejector priming device) requiring no periodic adjustment. Optional compressor clutch available.
- Extensive application flexibility handling sewage, slurries, and liquids with solids up to 3.0" in diameter.
- Dry-running high pressure liquid bath mechanical seal with high abrasion resistant solid silicon carbide faces.
- Close-coupled centrifugal pump with Dri-Prime system coupled to a diesel engine or electric motor.
- All cast iron construction (stainless steel construction option available) with cast steel impeller.
- Also available in a critically silenced unit which reduces noise levels to less than 70 dBA at 30'.
- Standard engine Caterpillar C2.2T (IT4 Flex). Also available with John Deere 4024TF281 (IT4 Flex).

Specifications

Suction connection	4" 150# ANSI B16.5
Delivery connection	4" 150# ANSI B16.5
Max capacity	1020 USGPM †
Max solids handling	3.0"
Max impeller diameter	10.1"
Max operating temp	176°F*
Max pressure	75 psi
Max suction pressure	58 psi
Max casing pressure	113 psi
Max operating speed	2200 rpm

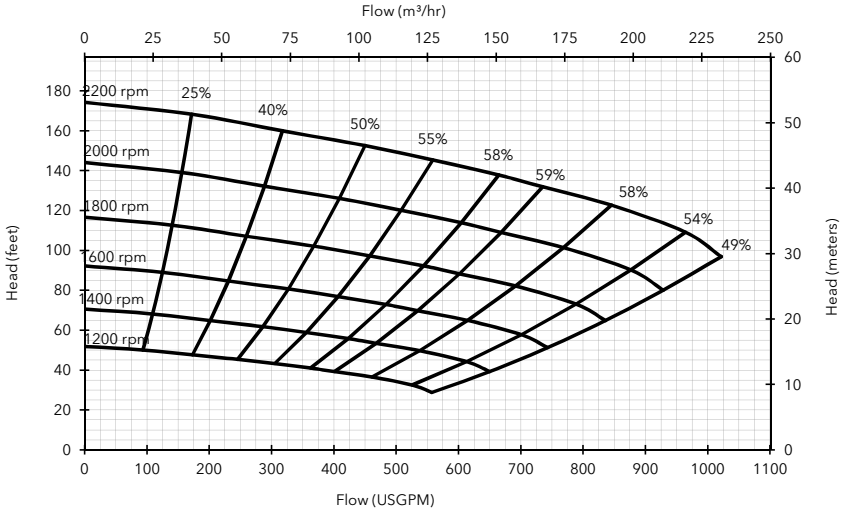
* Please contact our office for applications in excess of 176°F.

† Larger diameter pipes may be required for maximum flows.

Please contact the factory or office for further details. A typical picture of the pump is shown. All information is approximate and for general guidance only.

godwin
a xylem brand

Performance Curve



Materials

Pump casing & suction cover	Cast iron BS EN 1561 - 1997
Wearplates	Cast iron BS EN 1561 - 1997
Pump Shaft	Carbon steel BS 970 - 1991 817M40T
Impeller	Cast Steel BS3100 A5 Hardness to 200 HB Brinell
Non-return valve body	Cast iron BS EN 1561 - 1997
Mechanical seal	Silicon carbide face; Viton elastomers; Stainless steel body

Engine option 1

Caterpillar C2.2T (IT4 Flex), 41 HP @ 2200 rpm

Impeller diameter 10.1"

Pump speed 2200 rpm

Suction Lift Table

Total Suction Head (feet)	Total Delivery Head (feet)				
	78	103	127	152	176
	Output (USGPM)				
10	1022	915	646	350	-
15	996	834	538	215	-
20	888	753	431	-	-
25	807	646	269	-	-

Fuel capacity: 60 US Gal

Max Fuel consumption @ 2200 rpm: 2.4 US Gal/hr

Max Fuel consumption @ 1800 rpm: 2.0 US Gal/hr

Weight (Dry): 2,240 lbs

Weight (Wet): 2,650 lbs

Dim.: (L) 119" x (W) 66" x (H) 77"

Performance data provided in tables is based on water tests at sea level and 20°C ambient. All information is approximate and for general guidance only. Please contact the factory or office for further details.

Engine option 2

John Deere 4024TF281 (IT4 Flex), 46 HP @ 2200 rpm

Impeller diameter 10.1"

Pump speed 2200 rpm

Suction Lift Table

Total Suction Head (feet)	Total Delivery Head (feet)				
	78	103	127	152	176
	Output (USGPM)				
10	1022	915	646	350	-
15	996	834	538	215	-
20	888	753	431	-	-
25	807	646	269	-	-

Fuel capacity: 60 US Gal

Max Fuel consumption @ 2200 rpm: 2.6 US Gal/hr

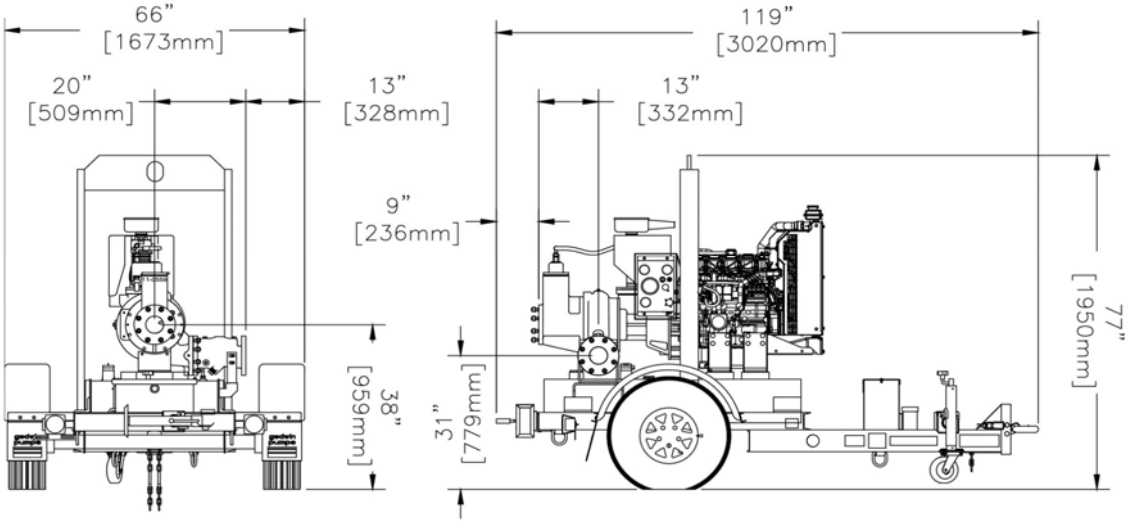
Max Fuel consumption @ 1800 rpm: 2.3 US Gal/hr

Weight (Dry): 2,400 lbs

Weight (Wet): 2,800 lbs

Dim.: (L) 119" x (W) 66" x (H) 77"

Performance data provided in tables is based on water tests at sea level and 20°C ambient. All information is approximate and for general guidance only. Please contact the factory or office for further details.



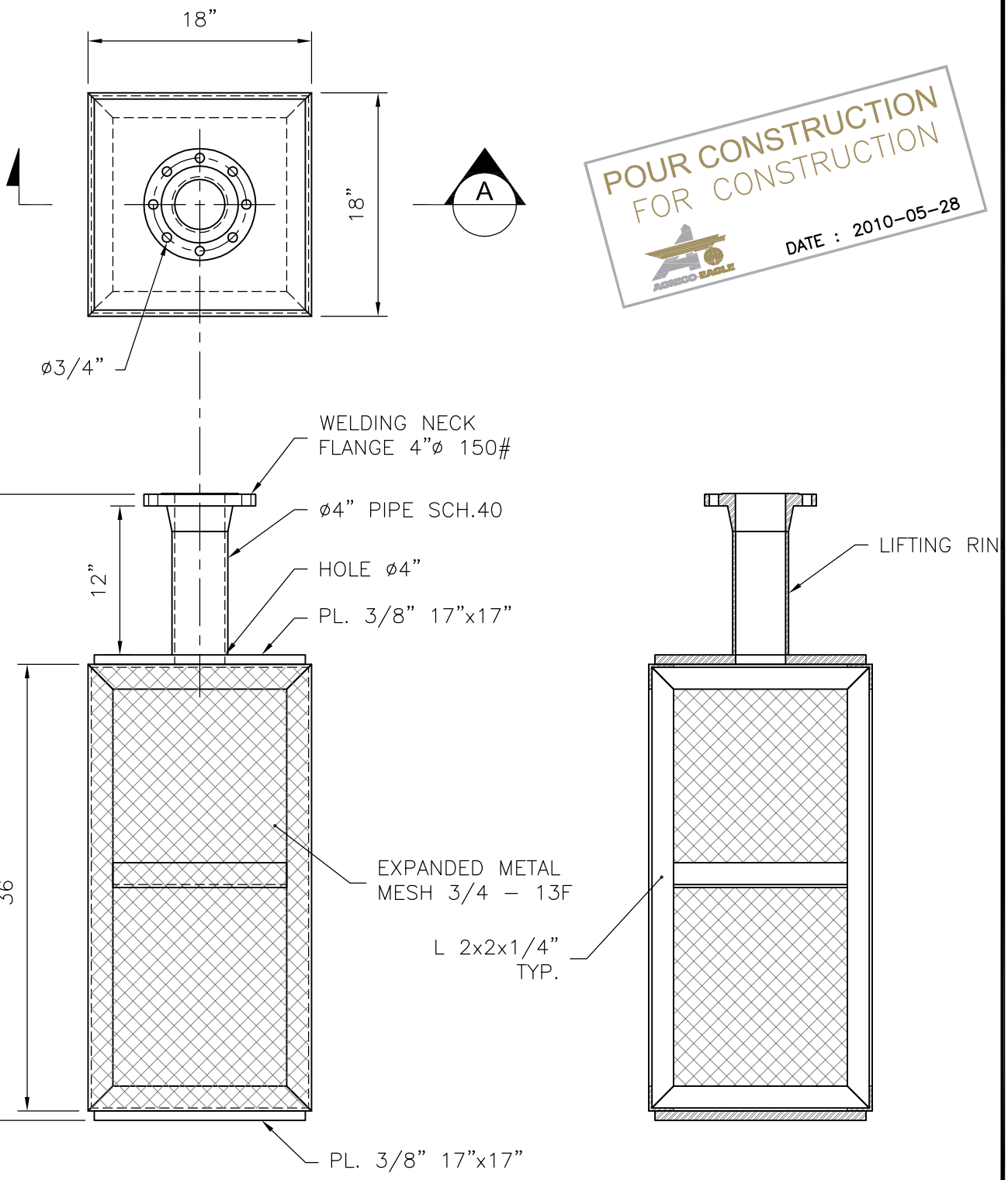
xylem
Let's Solve Water

84 Floodgate Road
Bridgeport, NJ 08014 USA
(856) 467-3636 . Fax (856) 467-4841
Email: sales@godwinpumps.com

Reference number : 95-1008-3000
Date of issue : February 26, 2014
Issue : 5

www.godwinpumps.com

Appendix 3: Typical Suction Cage



POUR CONSTRUCTION
FOR CONSTRUCTION
DATE : 2010–05–28

SIDE VIEW — *6 REQ'D*
SCL: 1" = 12"

SECTION A
SCL: 1" = 12"

REV	DATE	DESCRIPTION	PAR BY
0	2010–05–28	ISSUED FOR CONSTRUCTION	J.C.
A	2010–05–20	FOR TENDER	M.P.

REVISIONS

AGNICO EAGLE – MEADOWBANK DIVISION

AGNICO-EAGLE

DEWATERING
ARGT & DETAILS
SUCTION BOX ~ ø4" ~ 18"x24"

No. PROJET / PROJECT No.	009	DATE	2010–05–20
DESSINÉ PAR / DRAWN BY	J.CRETE		FEUILLE/SHT 1 / 1
APPROUVÉ PAR / APPROVED BY	D.LAFLAMME		
NO. DESSIN / DRAWING NO.	ST–00079		REVISION 0

AE–CART–ANSI A
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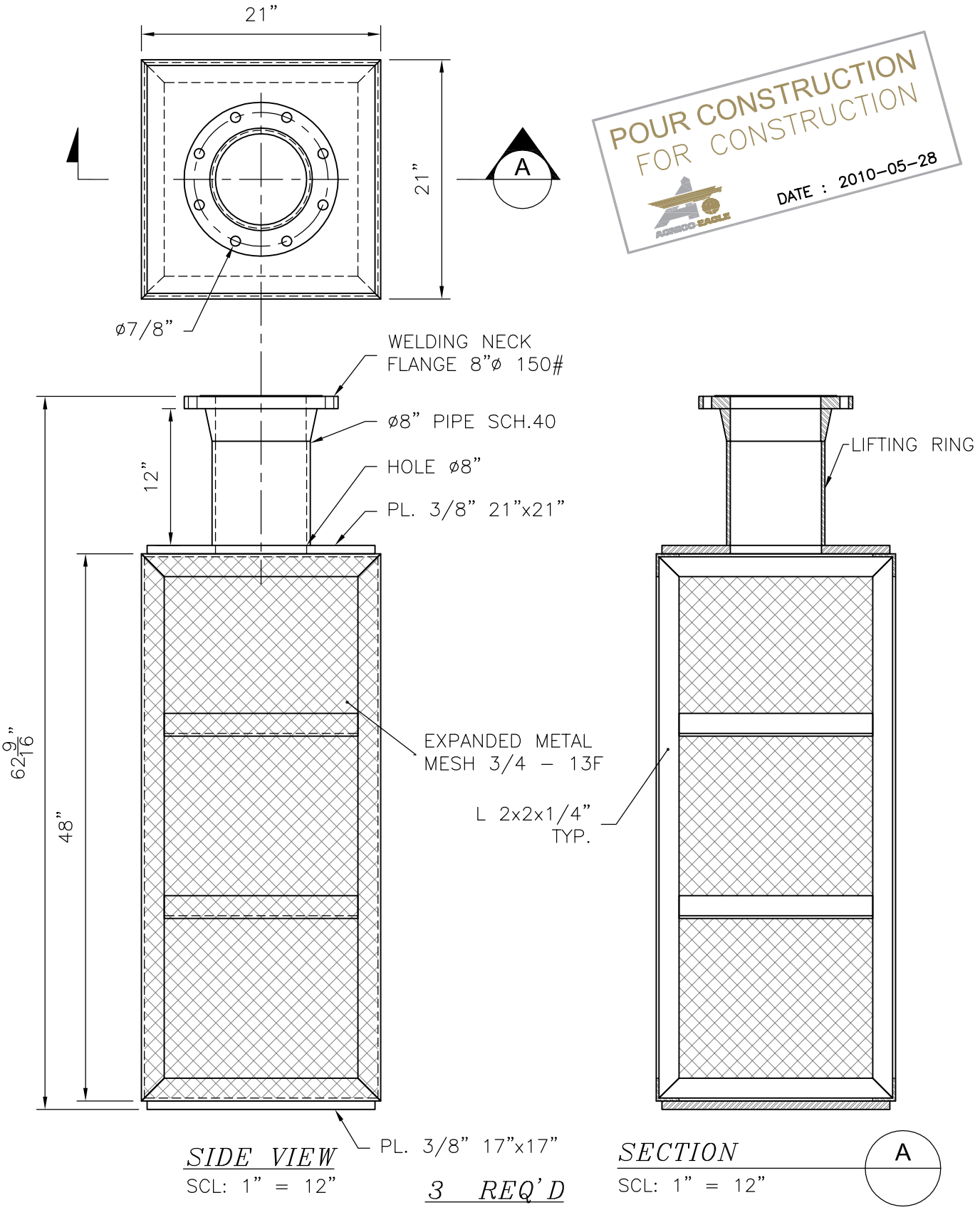
FILE NO. .DWG



POUR CONSTRUCTION
FOR CONSTRUCTION
DATE : 2010–05–28

REV	DATE	DESCRIPTION	PAR BY
0	2010–05–28	ISSUED FOR CONTRUCTION	J.C.
A	2010–05–20	FOR TENDER	M.P.

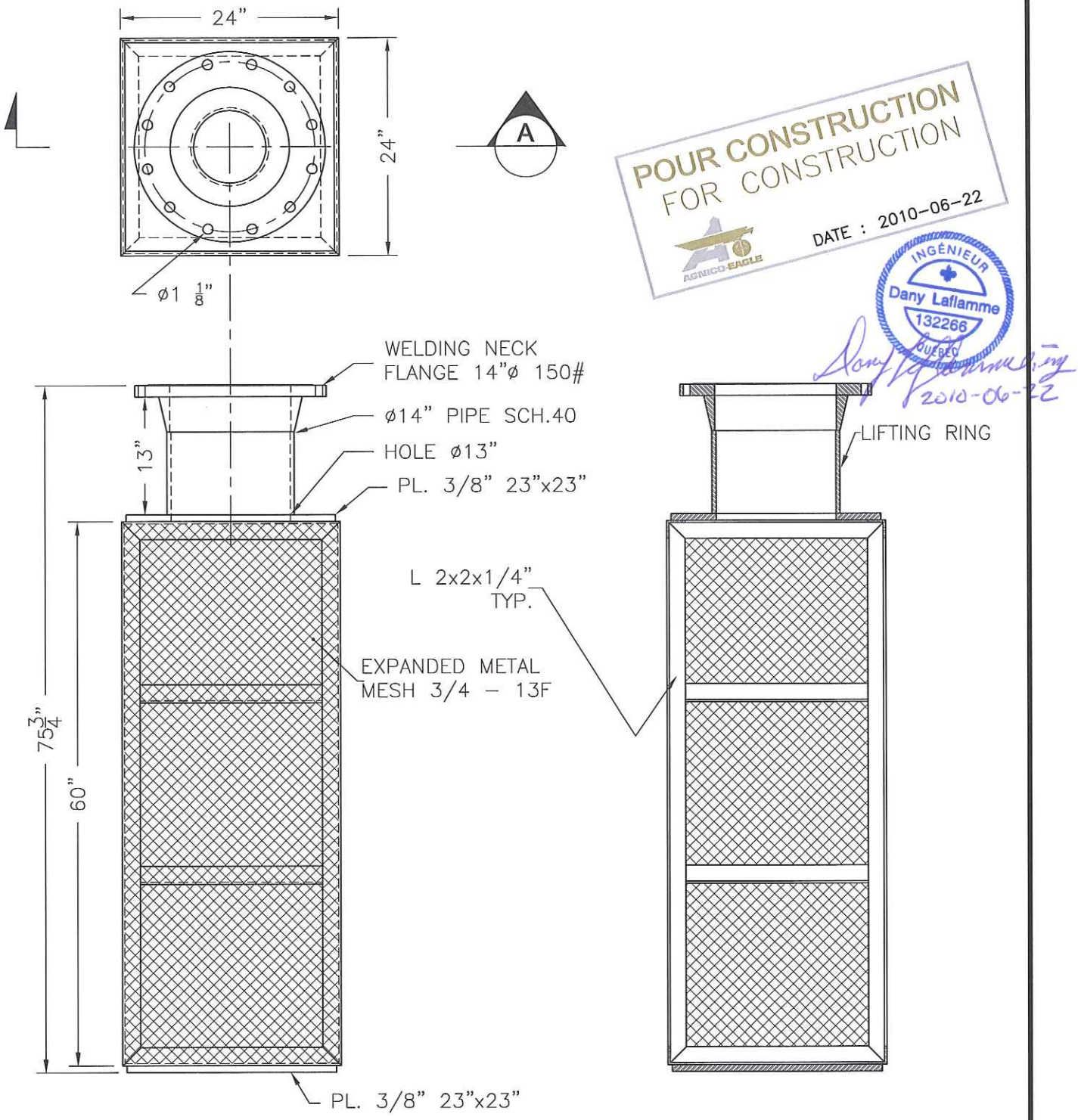
REVISIONS

AGNICO EAGLE – MEADOWBANK DIVISION

AGNICO-EAGLE

DEWATERING
ARGT & DETAILS
SUCTION BOX ~ ø8" ~ 21"x48"

No. PROJET PROJECT No.	009	DATE	2010–05–20
DESSINÉ PAR DRAWN BY	J.CRETE		FEUILLE/SHT 1 / 1
APPROUVÉ PAR APPROVED BY	D.LAFLAMME		
NO. DESSIN DRAWING NO.	ST–00098		REVISION 0



POUR CONSTRUCTION
FOR CONSTRUCTION
DATE : 2010-06-22

INGÉNIEUR
Dany Laflamme
132266
QUÉBEC
2010-06-22

SIDE VIEW
SCL: 3/4" = 12"

2 REQ'D

SECTION A
SCL: 3/4" = 12"

REV	DATE	DESCRIPTION	PAR BY
0	2010-06-22	ISSUED FOR CONTRUCTION	J.C.
A	2010-05-20	FOR TENDER	M.P.

REVISIONS

AGNICO EAGLE – MEADOWBANK DIVISION

AGNICO-EAGLE

DEWATERING
ARGT & DETAILS
SUCTION BOX ~ ø14" ~ 24"x60"

No. PROJET / PROJECT No.	009	DATE	2010-05-20
DESSINÉ PAR / DRAWN BY	J.CRETE		FEUILLE/SHT 1 / 1
APPROUVÉ PAR / APPROVED BY	D.LAFLAMME		
NO. DESSIN / DRAWING NO.	ST-00099		REVISION 0

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DRAWING NO. 61-648-270-203-R1

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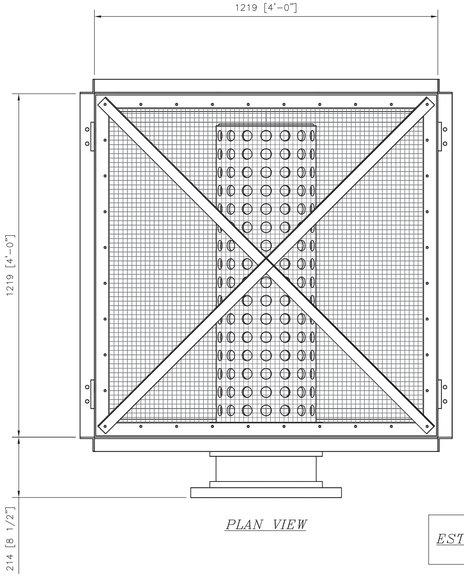
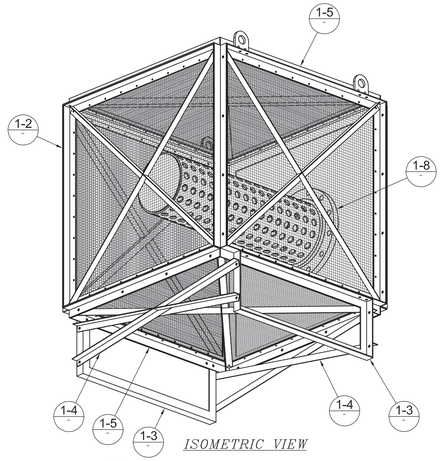


PLAN VIEW



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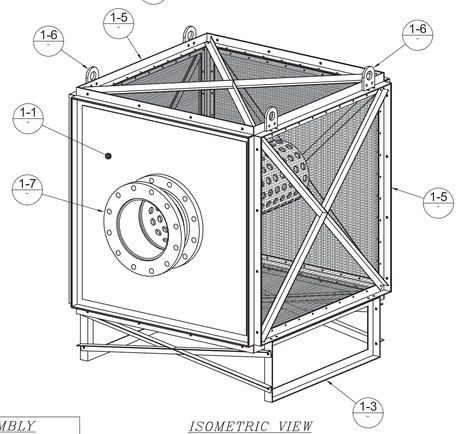
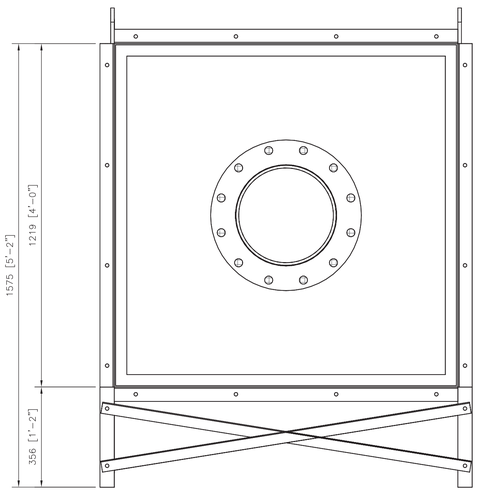
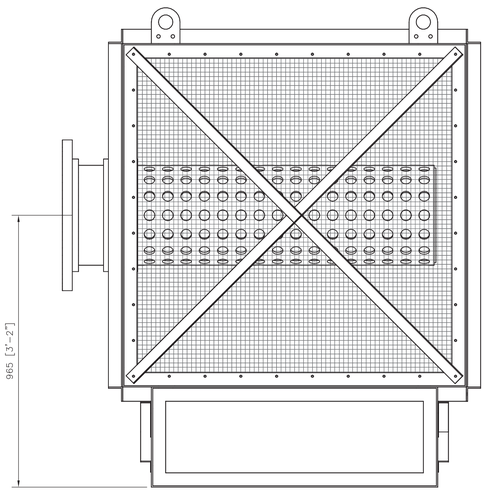


ISOMETRIC VIEW

ASSEMBLY
ESTIMATED WEIGHT:
475 KG



ELEVATION VIEW



SIDE VIEW

FISH CAGE ASSEMBLY
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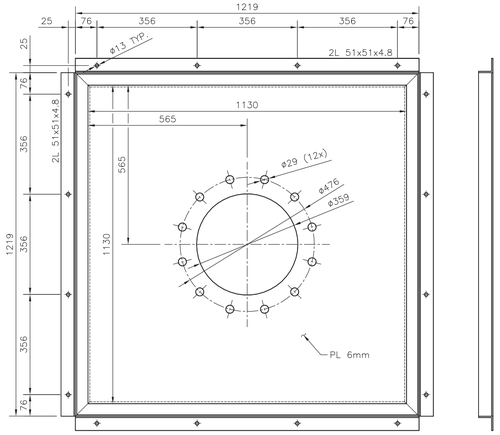

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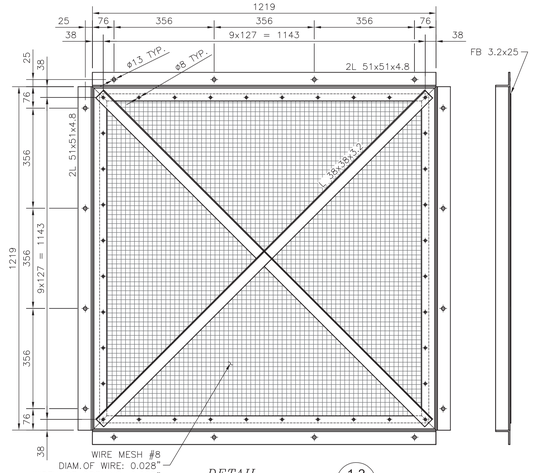

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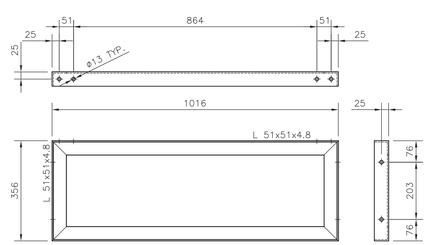

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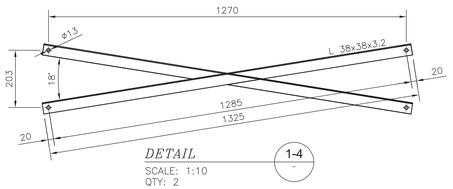

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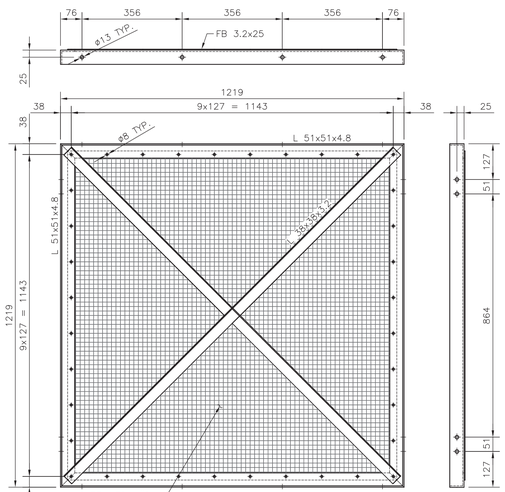

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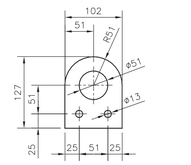
QTY: 4



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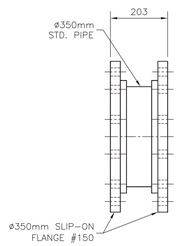

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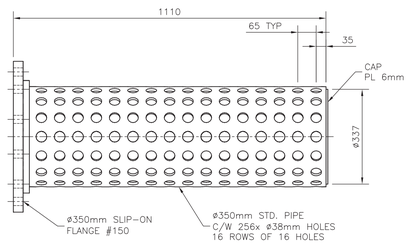

DETAIL 1-8
SCALE: 1:10
QTY: 1

PLAN CLÉ
KEY PLAN

NOTES GÉNÉRALES / GENERAL NOTES

- STRUCTURE : PAINTED STEEL AS PER GENERAL GUIDELINE DESIGN: 6115-000-245-GGD-003.
- WIRE MESH : PREFERRED STAINLESS STEEL UNPAINTED TO LIMIT CLOGGING.

PERMISSION ET HABILITATION
ORDRE DES INGÉNIEURS DU QUÉBEC
MYNOT
L3040
2020-03-25

DOCUMENT SIGNÉ ÉLECTRONIQUEMENT
ORDRE DES INGÉNIEURS DU QUÉBEC
Israël Gagnon
5 149137
PHYSIQUE
2020-03-25

POUR SOUMISSION
FOR TENDER
AGNICO EAGLE
DATE : 2020-03-25

DESSINS EN RÉFÉRENCE / REFERENCE DRAWINGS

TITRE / TITLE	# DWG
–	–
–	–
–	–
–	–
–	–
–	–
–	–

AGNICO EAGLE

REV.	DATE	DESCRIPTION	PAR/BY	APP.	CLIENT
1	2020/03/25	ADDENDUM #1	BL	IG	BR
0	2020/03/23	ISSUED FOR TENDER	BL	IG	BR

REVISIONS

SNC-LAVALIN
SNC-Lavalin Stavibel inc.
150, rue Gamble Ouest
Rouyn-Noranda (Québec) J9X 2R7
Tel. : 819 764-5181 Fax : 819 797-0158
www.snclavalin.com

Project # : 671087-0000

TITRE / TITLE
AGNICO EAGLE – MEADOWBANK DIVISION

TYPICAL PUMP SUCTION CAGE FOR HL250

DESSINÉ PAR / DRAWN BY	BRUNO LEMIEUX	DATE 2020/03/20
VÉRIFIÉ PAR / CHECKED BY	ISRAËL GAGNON	2020/03/20
APPROUVÉ PAR / APPROVED BY	ISRAËL GAGNON	2020/03/23
ÉCHELLE / SCALE	INDICATED	DATE 2020/03/20
NO. DESSIN / DRAWING NO.	61-648-270-203	
NO. PROJET / PROJECT NO.	61	REVISION 1 / FEUILLE / SHT 1 / 2

AE-CART-ARCH D

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FILE NO. 61-648-270-203-R1.dwg

Appendix 4: Pump and Pipeline Installation Specifications

SNC·LAVALIN	**AMARUQ WATER MANAGEMENT** Nunavut	AGNICO EAGLE

Lot #: 6127-C-265-003

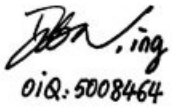
Installation Specifications

Pump and Pipeline Installation Specifications

Prepared by:

Anh-Long Nguyen, P. Eng.
OIQ Member No. 122858
NAPEG Member No. L2716

Verified by:



Dan Chen, P. Eng.
OIQ Member No. 5008464

Approved by:

Anh-Long Nguyen, P. Eng.
OIQ Member No. 122858
NAPEG Member No. L2716

R0	2021-01-07	Issued for Construction	ALN	DC	ALN
RB	2020-09-16	Issued for Client comments	ALN	DC	ALN
RA	2020-09-15	Issued for comments	ALN	DC	ALN
Rev.	**Date**	**Revision Description**	**By**	**Ver.**	**Appr.**
Client Document No. ***6127-C-265-003-SPT-002***			SNC Document No. ***668294-6000-40EF-0001***		
Client Project No. ***6127***			SNC Project No. ***668284***		

TABLE OF CONTENTS

TABLES

APPENDICES

1. GENERAL

Agnico Eagle Mines Limited, Meadowbank Division (AEM) is developing the Whale Tail Project, a satellite deposit located on the Amaruq property (Kivalliq Region of Nunavut, Canada). The Whale Tail Project construction is ongoing and commercial production has started in the third quarter of 2019. To continue mining and milling, AEM is proposing to expand the Whale Tail Project by expanding the Whale Tail pit, developing another open pit called the IVR pit and including underground mining operations. As part of the expansion project, new water management and geotechnical infrastructures shall be required for surface water management.

As part of the water management infrastructure, new pumps and pipelines are required to transfer contact water collected at different location on the site toward IVR Attenuation Pond. From this pond, the water is then pumped to the Amaruq Water Treatment Plant (AsWTP) for treatment. The treated water is then discharged to Whale Tail Lake South Basin (WTS) during the summer months (i.e. open water season).

2. SCOPE OF DOCUMENT

The following document provides general installation specifications and guidelines for the following infrastructure:

- Water transfer pumps.
- Water transfer pipelines.

The current document also provides QA/QC program for the installation and defines Contractor's and Owner's responsibility.

3. REFERENCE DOCUMENTS

Table 3-1 presents the reference documents to consult for the installation of the pumps and pipelines required to manage the contact water at the Amaruq site for Phase 2

.

Table 3-1: Reference Documents

Document Number	Revision	Title
61-695-200-202	R1	AGNICO EAGLE - AMARUQ DIVISION 695 – WATER MANAGEMENT 200 – PROCESS FLOW DIAGRAM AMARUQ PHASE 2 OPERATION WHALE TAIL PIT, WHALE TAIL ATTENUATION POND & WTP
61-695-200-203	R2	AGNICO EAGLE - AMARUQ DIVISION 695 – WATER MANAGEMENT 200 – PROCESS FLOW DIAGRAM AMARUQ PHASE 2 OPERATION WHALE TAIL WRSF AND EXTENSION, IVR WRSF & IVR ATTENUATION POND
61-695-200-204	R1	AGNICO EAGLE - AMARUQ DIVISION 695 – WATER MANAGEMENT 200 – PROCESS FLOW DIAGRAM AMARUQ PHASE 2 OPERATION IVR PIT & GSP PONDS AREA
61-695-200-205	R1	AGNICO EAGLE - AMARUQ DIVISION 695 – WATER MANAGEMENT 200 – PROCESS FLOW DIAGRAM AMARUQ PHASE 2 OPERATION WHALE TAIL SOUTH BASIN AND MAMMOTH LAKE
61-695-205-207	R1	AGNICO EAGLE – AMARUQ DIVISION 695 – WATER MANAGEMENT 205 – PIPING AND INSTRUMENTATION DIAGRAM AMARUQ PHASE 2 WHALE TAIL PIT, WHALE TAIL WRSF & EXTENSION PUMPING STATIONS
61-695-205-208	R1	AGNICO EAGLE – AMARUQ DIVISION 695 – WATER MANAGEMENT 205 – PIPING AND INSTRUMENTATION DIAGRAM AMARUQ PHASE 2 WHALE TAIL ATTENUATION POND AND PUMPING STATIONS
61-695-205-209	R1	AGNICO EAGLE – AMARUQ DIVISION 695 – WATER MANAGEMENT 205 – PIPING AND INSTRUMENTATION DIAGRAM AMARUQ PHASE 2 COMMON HEADER & TIE-INS TO AMARUQ WATER TREATMENT PLANT
61-695-205-210	R1	AGNICO EAGLE – AMARUQ DIVISION 695 – WATER MANAGEMENT 205 – PIPING AND INSTRUMENTATION DIAGRAM AMARUQ PHASE 2 IVR PIT AREA & PUMPING STATIONS
61-695-205-211	R2	AGNICO EAGLE – AMARUQ DIVISION 695 – WATER MANAGEMENT 205 – PIPING AND INSTRUMENTATION DIAGRAM AMARUQ PHASE 2 IVR WRSF & PUMPING STATIONS

Document Number	Revision	Title
61-695-205-212	R1	AGNICO EAGLE – AMARUQ DIVISION 695 – WATER MANAGEMENT 205 – PIPING AND INSTRUMENTATION DIAGRAM AMARUQ PHASE 2 IVR ATTENUATION POND & PUMPING STATIONS
61-695-205-213	R1	AGNICO EAGLE – AMARUQ DIVISION 695 – WATER MANAGEMENT 205 – PIPING AND INSTRUMENTATION DIAGRAM AMARUQ PHASE 2 UNDERGROUND MINE AND GSP PONDS AREA
61-695-205-214	R1	AGNICO EAGLE – AMARUQ DIVISION 695 – WATER MANAGEMENT 205 – PIPING AND INSTRUMENTATION DIAGRAM AMARUQ PHASE 2 TREATED WATER TO MAMMOTH LAKE OR WHALE TAIL SOUTH BASIN
61-695-230-202	R2	AGNICO EAGLE – AMARUQ DIVISION 695 – WATER MANAGEMENT 230 – GENERAL EARTHWORKS PLAN VIEW, PROFILE AND TYPICAL SECTION AMARUQ PHASE 2 OPERATION IVR ATTENUATION POND ACCESS RAMP AND PUMPING PAD
61-695-230-203	R0	AGNICO EAGLE – AMARUQ DIVISION 695 – WATER MANAGEMENT 230 – GENERAL EARTHWORKS PLAN VIEW, PROFILE AND TYPICAL SECTION AMARUQ PHASE 2 OPERATION LAKE A47 AND A49 ACCESS RAMPS AND PUMPING PADS
61-695-230-212	R1	AGNICO EAGLE – AMARUQ DIVISION 695 – WATER MANAGEMENT 230 – GENERAL EARTHWORKS PLAN VIEW, PROFILE AND TYPICAL SECTION AMARUQ PHASE 2 OPERATION ACCESS RAMPS AND PUMPING PADS OF IWA, IWB, IWC AND IWD SUMPS
61-695-270-217	R0	AGNICO EAGLE - AMARUQ DIVISION 695 - WATER MANAGEMENT 270 - PIPING AMARUQ PHASE 2 PIPE LAYOUT AND PROFILE OF IVR PIT AREA
61-695-270-218	R2	AGNICO EAGLE - AMARUQ DIVISION 695 - WATER MANAGEMENT 270 - PIPING AMARUQ PHASE 2 PIPE LAYOUT AND PROFILE OF IVR WRSF AREA

Document Number	Revision	Title
61-695-270-219	R0	AGNICO EAGLE - AMARUQ DIVISION 695 - WATER MANAGEMENT 270 - PIPING AMARUQ PHASE 2 PIPE LAYOUT AND PROFILE OF WHALE TAIL PIT AREA
61-695-270-220	R0	AGNICO EAGLE - AMARUQ DIVISION 695 - WATER MANAGEMENT 270 - PIPING AMARUQ PHASE 2 PIPE LAYOUT AND PROFILE OF IVR ATTENUATION POND AREA
61-695-270-221	R0	AGNICO EAGLE - AMARUQ DIVISION 695 - WATER MANAGEMENT 270 - PIPING AMARUQ PHASE 2 PIPE LAYOUT AND PROFILE OF WTP AREA
61-695-270-222	R0	AGNICO EAGLE - AMARUQ DIVISION 695 - WATER MANAGEMENT 270 - PIPING AMARUQ PHASE 2 PIPE LAYOUT AND PROFILE OF WHALE TAIL SOUTH LAKE AND MAMMOTH LAKE AREA
61-695-270-227	R3	AGNICO EAGLE - AMARUQ DIVISION 695 - WATER MANAGEMENT 270 - PIPING AMARUQ PHASE 2 PIPE LAYOUT
61-695-270-228	R0	AGNICO EAGLE - AMARUQ DIVISION 695 - WATER MANAGEMENT 270 - PIPING AMARUQ PHASE 2 WTP EXISTING COMMON HEADER EXTENTION
61-695-270-229	R1	AGNICO EAGLE - AMARUQ DIVISION 695 - WATER MANAGEMENT 270 - PIPING AMARUQ PHASE 2 WTP DISCHARGE HEADER
61-695-270-230	R0	AGNICO EAGLE - AMARUQ DIVISION 695 - WATER MANAGEMENT 270 - PIPING AMARUQ PHASE 2 HDPE PIPING TYPICAL INSTALLATION DETAILS

4. PUMP AND PIPELINE INSTALLATION SPECIFICATIONS

4.1 General Procedures

The following section describes the general installation procedure to install the different water transfer pump station and pipeline required to manage the contact water at the Amaruq site for Phase 2. The list of pumps required for Phase 2 is summarized in Table 4-1.

There are three types of pumps that will be installed at the Amaruq site to manage the contact water on site:

- Godwin HL250 containerized diesel pumps;
- Godwin CD103 trailer mounted diesel pump.
- Tsurumi LH-8110-60 8'' submersible electrical pump.

The installation procedure is similar for each of these pumps and consists of the following steps:

1. Install the pump along the ramp or pumping pad leading into the water collection basin. The pump will be installed close to the water level. Install all required accessories, such as diesel fuel storage tank. Ensure the pump skid or container is levelled.
2. Install the suction cage into the basin and connect the suction hose to the suction side of the pump. Ensure that the suction cage is at least 300 mm above the ground to limit entrainment during pumping.
3. Install the discharge piping from the water collection basin to the receiving basin. Install all relevant accessories as noted on the P&ID, including drain valve connection, air/vacuum release valve, isolation butterfly valves and magnetic flowmeters. Refer to Section 5 for details on the HDPE pipeline installation.
4. Connect the discharge piping to the pump.
5. Perform a mechanical inspection of the pump prior to start-up based on the manufacturer recommendations.

Table 4-1: Summary List of Pumps to Install

Pump Tag No.	Qty	Function	Pump Model
PP-10A	1	IVR Attenuation Pond to WTP – Line #1	Godwin HL250M Diesel Pump 12x10
PP-10B	1	IVR Attenuation Pond to WTP – Line #2	Godwin HL250M Diesel Pump 12x10
PP-10C	1	Spare Pump to manage flood event IVR Attenuation Pond to WTP	Godwin HL250M Diesel Pump 12x10
PP-11	1	North-West Sump to IVR Attenuation Pond (By-pass: Whale Tail Attenuation Pond)	Godwin HL250M Diesel Pump 12x10
PP-12	1	Sump IWB to IVR Attenuation Pond	Godwin CD103M Diesel Pump 4X4
PP-13	1	Sump IWA to IVR Attenuation Pond	Godwin CD103M Diesel Pump 4X4
PP-14	1	GSP-1 pond to GSP-2 pond	Godwin CD103M Diesel Pump 4X4
PP-15	1	Former Lake A47 to IVR Attenuation Pond (By-pass: Whale Tail Attenuation Pond)	Godwin HL250M Diesel Pump 12x10
PP-16	1	Former Lake A49 to IVR Attenuation Pond (By-pass: Whale Tail Attenuation Pond)	Godwin CD103M Diesel Pump 4X4
PP-17	1	IVR pit to IVR Attenuation Pond (By-pass: Whale Tail Attenuation Pond)	From existing AEM pit dewatering pump inventory
PP-18	1	Whale Tail pit to IVR Attenuation Pond (By-pass: Whale Tail Attenuation Pond)	From existing AEM pit dewatering pump inventory
PP-19	1	Sump IWC to IVR Attenuation Pond Watershed Or Sump IWD to IVR Attenuation Pond	Godwin CD103M Diesel Pump 4X4
PP-21	1	Mammoth Dike Sump to North-West Sump	Godwin CD103M Diesel Pump 4X4
PP-22A	1	Whale Tail South Basin to Mammoth Lake – Line #1	Godwin HL250M Diesel Pump 12x10
PP-22B	1	Whale Tail South Basin to Mammoth Lake – Line #2	Godwin HL250M Diesel Pump 12x10
PP-23	1	WT WRSF to IVR Attenuation Pond (By-pass: Whale Tail Attenuation Pond)	Tsurumi LH-8110-60 (8”) Submersible Pump

4.2 Installation Testing

The Contractor shall conduct an in service operation test to verify for leaks.

The Contractor shall check for leaks in the piping and at each flange connection as soon as the pumps start and repair if necessary. Flanged joints shall be installed at each low point.

The Operation Team (E&I) shall check if the pump operates within its operating range and suction lift capacity. To do this task the following operating conditions must be recorded:

- Flowrate
- Pump discharge pressure, and
- Motor amperage.

The Operation Team (E&I) shall purge the discharge line at all low point if the pump is stopped for a prolonged period.

5. PIPING GENERAL INSTALLATION SPECIFICATIONS

5.1 HDPE Pipeline Installation

Take into consideration the expansion of the HDPE. Typically, the HDPE pipeline is installed in summer. In winter, the shrinkage of the HDPE piping is important. The expansion or shrinkage of the HDPE pipeline must not cause it to snake onto the road or risk of slipping into inside slope. Add extra length or concrete blocks on the pipe to immobilize the pipe if necessary.

5.2 Standards and Reference Manuals

The most recent versions of the following standards are applicable for the project.

5.2.1 ANSI / AWWA

AWWA M55 PE Pipe – Design and Installation

5.2.2 Plastics Pipe Institute (PPI)

1. PPI Handbook of Polyethylene Pipe - 2009 (2nd Edition)
2. PPI TN-42 Recommended Minimum Training Guidelines for PE Pipe Butt Fusion Joining Operators for Municipal and Industrial Projects (March 2013)
3. PPI TR-33 Generic Butt Fusion Joining Procedure for Field Joining of Polyethylene Pipe (2012)

5.2.3 ASTM

ASTM F905 Routine Practices for the Qualification of Saddle Joint Assembly in Polyethylene Conduit

ASTM F 1055 Specification Standard for Electro-fusion Polyethylene Fittings for

	Polyethylene Pipe and Piping of Controlled Outside Diameter
ASTM F 2164	Routine Practices for Field Leak Testing of Polyethylene (PE) Pressure Pipe Networks Using Hydrostatic Pressure
ASTM F 2620	Routine Joining Practices by Melting Polyethylene Conduit and Fittings
ASTM D 3261	Specification Standard for Butt Fusion Joining of Polyethylene (PE) Plastic Fittings for Polyethylene (PE) Plastic Pipe and Piping

5.3 Quality Assurance

In his bid, the Contractor shall ensure that all the pumps, pipes and relevant accessories are installed following the engineering drawings with proper field adjustment. The Contractor shall provide all relative costs associated with supervision services and testing for HDPE pipe fusion and flanged connections.

5.4 Supply of HDPE Pipes and Accessories

The supply of HDPE piping, accessories, insulation, and heat-tracing to be used in this project are provided by AEM.

5.5 Piping Assembly Method

5.5.1 Butt Fusion Joints

The pipe shall be assembled using the butt fusion joining procedure described in ASTM F 2620 or PPI TR-33. All fusion assemblies must be done as recommended by the pipe or fittings manufacturer. Fusion assemblies must be performed by a technician qualified in this field according to PPI TN-42.

Fusions must be performed by experienced technicians. For Contractors, the qualification of the field technician must be demonstrated by proof of training recognized by the pipe manufacturer.

5.5.2 Electro Saddle Fusion

If required, electro saddle fusions must be performed in accordance with ASTM F 2620 or PPI TR-41, or as recommended by the fitting manufacturer and according to PPI TR-41. Saddle fusion assemblies must be performed by experienced technicians. For Contractors, the qualification of the field technician must be demonstrated by proof of training within the past year specifically tied

to the equipment to be used for this project. Saddle fusion is used to assemble branch saddles, tapping tees and other HDPE constructions on the main pipe wall. (see ASTM F905).

5.5.3 Mechanical Joints

If required, the mechanical connection of HDPE to ancillary equipment such as valves, pumps and fittings shall use adapters for mechanical connections and other equipment in accordance with the PPI Polyethylene Piping Manual, Chapter 9 and the AWWA M55 Manual of Good Practice, chapter 6.

Mechanical coupling shall be executed by experienced technicians. For Contractors, the qualification of the field technician must be demonstrated by proof of training in mechanical couplings within the past year. This training must be done on the equipment and the components of the pipe that are used for this project.

5.6 Preparation

For pressure systems, HDPE pipe and fittings shall be installed in accordance with ASTM D2321 or ASTM D2774 and the AWWA M55 PE Pipe – Design and Installation, Chapter 7.

5.6.1 Regulatory Requirements

The Contractor must comply with provincial/territorial requirements for workspace safety standards and worker protection for excavation work.

The Contractor must possess the SKILLS AND ADEQUATE EQUIPMENT to ensure quality results and must be recognized by the manufacturer of HDPE piping.

The contractor must take initiatives to prevent spreading of COVID-19. The contractor shall follow Agnico Eagle Safety Instruction, OSHA Guidance on preparing workplace for COVID-19 and Nunavut Department of Health and Canadian Public Health Agency recommendations.

5.7 Pipe Installation

5.7.1 Cushion

The pipes shall be installed directly on the natural ground. The pipes shall be installed along the road on the ground except where fill is required in low points to properly support the pipe (for

example, natural depression or holes in the ground where pipes must cross). If the pipe is placed on a cushion, the low points along the cushion must be raised to ensure a uniform support. The fill material used for the cushions and filling shall be muck.

5.7.2 Flanged Connections

Flanged connections shall be provided every 250 to 330 ft along the HDPE pipeline. Flanged connections shall also be provided wherever a butterfly valve or flowmeter is required.

5.7.3 Insulation and Heat Tracing

When required, pre-insulated HDPE piping are provided. After assembling the pipeline and installing the heat-trace elements per the manufacturer's instruction, install the provided insulation kit around each butt-fusion joint and flanged connection. It is to be noted that bubble wrap type of insulation at flanged connections is not accepted.

5.8 Contractor Testing

In service test on the HDPE piping is required to detect any leaks. If the test section fails this test, the Contractor shall repair or replace all defective materials and/or labour at no additional cost to the Buyer.

For safety reasons, the pneumatic (compressed air) leakage test of the HDPE pipe under pressure is prohibited.

5.9 Cleaning

Following the tests, the line must be cleaned in accordance with AWWA M55 Manual, Chapter 10.

5.10 Culvert Installation

The culvert must be installed with minimum slope to evacuate runoff.

6. QUALITY CONTROL AND QUALITY ASSURANCE PROGRAM

6.1 Definitions

- Quality: Quality is defined as fitness to intended function and/or purpose.
- Quality Assurance (QA): A planned and systematic pattern of all means and actions designed to provide adequate confidence that products or services meet contractual and jurisdictional requirements and will perform satisfactorily in service.
- Quality Control (QC): Actions which provide a means to measure and regulate the characteristics of an item of service to established requirements.
- Quality Plan: A written description of intended actions to control and ensure quality. The Quality Plan defines applicable quality policy and procedures for the project.
- Quality Program: The co-ordinated execution of applicable QA and QC plans and activities for a project.
- Quality System: The documents that describe and govern the systematic application of the quality program.
- Contractor: Contractor that shall be performing the work
- Owner: Agnico Eagle Mines (AEM)
- Engineering & Construction: AEM Construction Team
- Quality Control Responsible: AEM Construction Team
- Quality Assurance Responsible: AEM Engineering (E&I)

6.2 Contractor's Responsibility for Quality of the Work

Be solely responsible for quality control and quality of the work, including the work of all sub-Contractors, sub-consultants, suppliers, manufacturers and fabricators. Submit full documentary evidence of quality control of the work.

6.3 Contractor's Quality Organization

Provide an organization to ensure quality work. Contractor leaders and supervisors shall execute the Quality Program.

Ensure that QC personnel have a thorough working knowledge of the products/processes to be addressed on this contract and have the requisite.

All QC activities on this contract are subject to QA auditing, as deemed necessary by the Engineer. Co-operate with the Engineer undertaking these audits, including providing access to all work areas (suppliers, off-site manufacturing and fabrication, on-site construction) and provide all requested quality related documentation (e.g., supplier's/manufacturer's specifications, standards and operations and/or maintenance manuals, etc.).

6.4 Contractor's Quality Control System

The Contractor shall submit the following parts of the Contractor's system at time of tender, following AEM guidelines and QC directives:

- Contractor's Quality Policy and Statement of Corporate Commitment to Quality; QA/AC Organizational Structure;
- Contractor's Quality Manual including its established and documented QA/QC processes and procedures covering the subjects indicated in the contract Supplementary Conditions;
- QA/QC manuals and documented processes and procedures of sub-consultants, sub-Contractors, suppliers, manufacturers and fabricators.

Following award of the contract, submit the contract QC Plan as described in Paragraph 6.5 below, to the Engineer for review.

6.5 Contractor's Quality Control Plan

Plan, prepare, and submit a fully documented QC Plan for the contract. Address and detail the control provisions for the following elements. Reference and append existing company procedures to be used for this contract:

1. Management Responsibility: Describe the Quality Organization and individual responsibilities and/or activities;

2. Documented Quality System: Reference applicable quality manuals, procedures, and this Quality Plan;

3. Product Identification and Traceability: Describe the system for materials and production description, tagging, and continued identification throughout the work processes;

4. Process Control: Identify specific work-flow processes and required in progress control procedures/techniques (e.g., welding, etc.);

5. Inspection and Testing (I&T): Identify I&T organization and provide inspection checklists;

6. Inspection Measuring and Testing Equipment: List I&T equipment requiring calibration. Indicate specific recalibration schedules (such as butt-fusion machines);

7. Inspection and Test Status: Describe segregation, classification, tagging, and stage-by-stage handling of non-conforming work; tag signing and authorization required to proceed to next stage;

8. Non-Conformance: Describe identification and documentation of non-conformances;

9. Corrective/Preventative Actions: Outline how corrective actions will be classified, documented, authorized, verified, and how measures will be taken to prevent reoccurrences;

10. Quality Records: Describe procedure for collecting quality records and for keeping Engineer informed. List all records to be handed over to Owner at contract completion;

11. Quality Assurance Audits: Outline audit schedule and documentation proposed;

12. Training: Outline any staff training planned/required on this contract. Indicate training already received by quality control staff;

13. Environment and Workplace: Identify measures to maintain the workplace and environment in contract and jurisdictional conformance. Reference applicable agency and Owner regulations and requirements.

6.6 Owner Regulations and Requirements

Require sub-consultants, sub-Contractors, suppliers, manufacturers, and fabricators providing work on the contract on behalf of the Contractor, to implement all applicable elements of this Plan, including where necessary the submission of individual QC Plans to the Contractor. It is the Contractor's responsibility to integrate such Plans into its contract-wide QC Plan.

Submit as part of the QC Plan, all QC Forms intended to be used on the contract. Include clear delineation of responsibilities for form initiation, performance of actions, recording of compliance intent, verification of completed activities, achievement of quality conformance, approvals and sign-offs.

Include in the QC plan for regular submission of reports to the Engineer on quality control results, including deficiencies and the associated proposed and/or completed correctives actions. Provide a list of proposed reports and the submissions schedule. Include for non-recurring and special reports. Schedule regular weekly quality control review meetings with Engineer.

Submit the completed draft QC Plan for the contract and all relevant documentation to AEM Engineering for review. Incorporate the review comments and submit the final version of the QC Plan.

Appendix A presents the proposed QA/QC program for the assembly of the pumping system (pipes and pumps) and its accessories including the QA/QC plan for HDPE pipe fusion. AEM Quality Control Strategy, data logger and daily check list are proposed in Appendix B.

Supplement and update the QC Plan in the course of the contract, as necessary, and where required by the Engineer.

The Engineer's review of the QC Plan (or any testing or inspection the Engineer may perform) for the contract does not relieve the Contractor, or his agents, of responsibility for compliance of the finished work with the contract documents.

6.7 Inspections and Testing by the Contractor

Provide all routine daily and special inspection necessary to ensure the quality of the work. Be responsible for all inspection and testing required by the contract documents, statutes,

regulations, by-laws, standards or codes or any other jurisdictional requirements. Where witnessing of inspection and testing by the Engineer is called-for in the specifications, give timely notice of readiness for witnessing, and date and time for attendance by the Engineer. The QC representative of the Owner will notify the Contractor prior to the start of such tests but the QC Representative of the Owner shall not be required to wait for the arrival of the Contractor.

Full time visual inspection during fusion will be carried out by the QC Representative of the Contractor to ensure that the fusion meets the design requirements. The QC Representative shall produce data logger data for fusion and Installation QC Checklist and other relevant information.

Implement the QC Program to organize, document and demonstrate that the work is performed in accordance with the contract documents.

Incorporate in the QC program, all necessary inspection and testing of work on the contract that is carried out by the Contractor's sub-consultants, sub-Contractors, suppliers, manufacturers and fabricators.

6.8 Inspection and Testing by the Engineer

The Owner reserves the right to conduct inspection and testing without notice to the Contractor. The Contractor shall provide assistance when required for collecting and handling the pipe or fusion samples. Sampling or testing required by the QC Representative shall be executed by the Contractor without delay. All samples and tests shall be taken or performed in accordance with the appropriate standard, approved by the QC Representative, and shall meet the requirements of the present document.

The Engineer will appoint his own staff and/or an independent inspection and testing company to carry-out such inspection and testing of the contract work he deems necessary. Costs for such inspection and testing will be paid by the Owner. However, inspection and testing that is undertaken due to suspected and subsequently demonstrated, non-conformance of the work to the contract documents shall be at the Contractor's expense.

Should the Contractor's Quality Program prove ineffective or is not being applied in accordance with the finalised QC Plan, the Engineer will place the Contractor on written notice to provide satisfactory service within five (5) working days. If the Engineer determines that the Contractor

has failed to give the required satisfaction, the Owner reserves the right to conduct such inspections and testing as he deems necessary to ensure conformance to contract quality requirements. This inspection and testing shall be at the Contractor's expense.

Co-operate fully with the Engineer in his inspection and testing activities. Where such activities are necessitated by suspected non-conformance of the work, inspections and testing by the Engineer will be promptly made. Uncover for examination any such work and make good at no cost to the Owner. The Engineer may inspect and test products during the manufacture, fabrication, shop testing, installation, construction and commissioning phases of the contract. The Engineer will ascertain the quantity and quality of testing to be performed. Inspection and testing may be performed at the place of manufacture/fabrication, storage, or at the site, as designated by the Engineer.

Where inspection and testing by the Engineer is done, either during manufacture, fabrication or construction at the site, ensure that proper facilities and assistance are provided. The Engineer will formally notify the Contractor of found non-conformances. Take corrective action at no cost to the Owner.

6.9 Defective Work

Work which does not conform with the requirements of the contract shall be considered as defective. The work shall be removed and replaced with acceptable products at no cost to the Owner. Do not use defective products which have been corrected unless the Engineer has approved them. Handle the disposition of any work in non-conformance to the contract documents as directed by the Engineer. Control the work by segregation, quarantining, marking, tagging, and staging. All corrective and/or preventative actions shall be acceptable to and verified by the Engineer and released only upon written acceptance by the Engineer.

6.10 Quality of Materials

Use products and materials from the Owner or new products and materials supplied by the Contractor, warranted to be of the quality specified, throughout the permanent work. Incorporate these in such manner as to produce a completed construction in accordance with the contract documents.

Used materials may be employed for temporary work. Such materials shall be structurally sound and acceptable to the Engineer.

Provide documentation to the Engineer of the quality of products and materials to be incorporated into the work.

6.11 Substitutions

The contract documents are not intended to preclude the use of any product which is not specified. In the specifications the manufacturer's name, catalogue number, etc., may be given to identify products to be used. The specific products mentioned, indicate the type, function, minimum standard of design, efficiency, durability and quality required, but shall not be construed to exclude products which, in the opinion of the Engineer, are acceptable substitutions. Use of substitutions will only be permitted when the Engineer advises the Contractor in writing that such a substitution has been approved. Substitutions to methods or processes described in the contract documents, may be proposed for the consideration of the Engineer. Ensure that such substitutions are in accordance with the following requirements:

- Substitutions shall be proposed no later than 10 days prior to the scheduled date for the applicable submittal requirement;
- Proposed substitutions have been investigated and complete data is submitted in accordance with the specifications;
- Data relating to changes in the contract Schedule and the impact on other work has been submitted;
- Equal or better guarantee is given for the substitution as for the original product specified;
- There will be no extra cost to the Owner resulting from the use of a substitution.

Appendix A: ***QA/QC Program***

Appendix B: ***AEM Quality Control Strategy, Data Logger and Daily Checklist***

APPENDIX A: QA/QC PROGRAM

QA/QC PROGRAM : PUMPS AND PIPELINE INSTALLATION

AGNICO EAGLE

Item	Material	QA Inspector			QC Representatives			Owner's representative – Engineer
		Task	Frequency	Form to be filled	Task	Frequency	Form to be filled	
Correct pipe installed	All pipes	Visual assessment to confirm correct pipe diameter and type are installed.	Daily Inspection	Inspection report	Ensure that the correct pipes (i.e. pipe diameter and DR type) are installed (see numerical code printed on pipe) and pipes are not damaged	Continuously	Included in Installation report (Check list)	Coordinate and compile information
Proper pipe storage and handling procedures	All pipes	Visual inspection to confirm the HDPE pipe is not damaged	As needed or done at all storage area	Inspection report	Visual inspection	Continuously	Included in Installation report (Check list)	Ensure piping is not damage during storage and handling
Fusion (butt fusion)	All pipes	Visual assessment Inspect of registered fusion parameters	1 out of 2 butt fusions	Inspection report	Testing standard ASTM F2620 Make sure that all necessary tools are available Respect standard fusion procedure and record fusion parameters (heat temperature, soak time and cooling time) Visual inspection of fusion beads	Continuously on every fusion	Included in Installation report (Data logger)	Make sure that the fusion is visually robust, and all fusions conditions are documented.
Flange connection at each 250 m and by-pass points	All pipes	Visual assessment of the flange connections. Confirm all MTO are assembled (gaskets and bolts) Validate the location of flange connections respect 250 meters	1 out of 2 flange connections	Inspection report	Record the location of each flange connection Make sure all the components such as gaskets and bolts are not forgotten.	Continuously on each flange connection	Included in Installation report (Check list)	Ensure that the flange connection is well installed at each 250 m
Pre-Insulated Pipe Assembly	Pre-insulated pipe assembly for off-shore submerged heat traced pipe	Visual assessment of butt-fusion. Visual inspection to confirm heat trace channel are connected together between pipe segments. Visual assessment of the connection/joints of the insulation jackets. Inspect of registered parameters recorded by the Contractor.	Spot check at joints and at termination end of the pre-insulated pipeline	Inspection report	Ensure all materials are available for the assembly. Visual inspection: • Ensure heat trace channel between pipe segments are aligned and connected with proper fittings. • Insulation kit and Super-seal shrinking is well done between each section of insulation jackets • Insulation kit installed on the submerged end of the pipe is well done.	Continuously on each installation	Included in Installation report (Check list)	Ensure that the manufacturer procedures are followed and the insulation is water proof to protect the heating cables
Pump discharge connection	All connections	Visual assessment of the connections between the discharge pipeline and the pump.	Each pump connection	Inspection report	Visual inspection. Make sure that the reducers are installed between the pump outlet and the discharge pipe if required.	Each pump discharge connection	Included in Installation report (Check list)	Ensure that the pump discharge connection is done and no leak is observed.
Valve installation	All valves	Visual assessment of no leak and that the valves work properly when being opened and closed	1 out of 2 valve installations	Inspection report	Visual inspection and make sure that the valves (check valves and butterfly valves) are well installed without leak. Spacers between HDPE pipe and valves shall not be forgotten.	Each valve installation	Included in Installation report (Check list)	Ensure that the valves are installed, and no leak is observed.
Flowmeter installation	All flowmeters	Visual assessment of the flowmeter and well tagged without leak	Each flowmeter installation	Inspection report	Visual inspection and make sure that the flowmeters are well installed following the recommendation of the manufacturers,	Each flowmeter installation	Included in Installation report (Check list)	Ensure that the flowmeter are installed, and no leak is observed.
Suction pipe installation	All suction pipes	Visual assessment of the connections between the suction pipeline and the pump.	Each pump connection	Inspection report	Visual inspection and make sure that the reducers are installed between the pump inlet and the suction pipe if required.	Each pump suction connection	Included in Installation report (Check list)	Ensure that the pump suction connection is done and no leak is observed.
Suction cage installation	All water intakes	Inspect the location of the suction cage to respect the designed dewatering water level; inspect the connection between the suction cage and the suction pipe	Each suction cage	Inspection report	Visual inspection of the suction cage to make sure that the apertures are not obstructed. Make sure the connection between the suction cage and suction pipe is well done. The suction cage shall be carefully placed to the designed water level.	Each suction cage	Daily report	Ensure that suction cages are installed in the basin
Energy dissipator construction	All discharge pipe end	Inspect that the energy dissipator is well constructed and the pipe ends are secured without swinging due to the water flow and the temperature	Each energy dissipator	Inspection report	Make sure that energy dissipators are constructed with muck without excessive fines. Immobilize the discharge pipe end to avoiding moving and place properly the discharge pipe end onto the energy dissipator.	Each pipe discharge end	Daily report	Ensure that discharge pipe end is directly placed on the energy dissipator and no erosion will be observed
Pump Installation	Dewatering Pumps	Visual assessment that the correct pump is installed. Note pump operating performance (pump operating speed, discharge pressure, flow rate)	Each pump set-up	Each pump set-up	Make sure that the correct pump model is installed at the correction position. Ensure the pump is properly secured on the pad. Ensure piping connections to the pump are properly installed.	Each pump set-up	Included in Installation report if applicable	Ensure that the pumps are properly installed and commissioned.

APPENDIX B: AEM Quality Control Strategy, Data Logger and Daily Checklist

AGNICO EAGLE

6127 – HDPE

Quality control strategy

Document number: 6127-000-100-QQY-001

Marc-André Beaudet
2020/08/13

REV.	Description	Revised by	Date
0	Issued for approval	Marc-André Beaudet	2020/08/13

Approved by	Title	Signature	Date
Daniel Séguin	Construction Manager		
Alexandre Lavallée	Water&Tailings superintendant		

Table of content

1 Fusion QC

With the proper equipment on site, data logger report will be generated for each fusion joint. See Appendix 1 for example of report.

Each joint will be identified by a sequential number and will be punched by the operator.

A visual inspection is also completed for each joint/pipe sections. The answers are written by the operator in the comments section of the Data Logger report. There are three (3) questions to be answered:

Question	Answer
Is the pipe clean of debris? (Ice, snow, rocks, etc)	Y/N
Is the insulation of the pipe in good shape?	Y/N
Is the pipe damaged (Grooves, cracks, marks, cuts, etc)	Y/N

The operator will only write the answer and not the question.

2 Installation QC

A daily report will be saved at each end of shifts. See Appendix 2 for example of report.

QC inspection will be done for each line section (350') during the installation. The identification of the lines sections are sequential and the starting point is identified on the report.

The resident engineer will be doing regular walks down during the installation and correct any deficiencies with the supervisor on the field. Key observation points:

- Line routing
- Instruments installation
- General inspection (proper pipe size, cleaning, insulated or not, …)

3 VPO

VPO will be done.

Walk down and mechanical completion of the line done with client and signed off. If needed, deficiency list will be generated.

Construction is responsible of any leaks on the first start/fill of the line. A walk down with a witness from the operation, if possible, will be done at system start up.

Appendix

Appendix 1: Data Logger report (example)

Appendix 2: Installation daily report

Printed: 2020-08-12 11:52:46 UTC

McElroy Joint Report

Reference Number 2181815

Job Details

Joint Number	1
Joint Time	2020-08-08 20:41:20 GMT
Job	Amaruq old pipe
Operator	Steven Plante
Tie-In	No
Aborted Joint	No

Fusion Machine

Machine Name	TracStar® 618 HF
Machine Model	TracStar® 618 HF
Piston Area	11.78 in²
Using In-Ditch Kit	No

Pipe Specifications

Pipe Material	PE3408
Pipe Size	14 " IPS
Wall Thickness	DR 11

Pressures

Drag Pressure	50 psi	
	Interfacial	Gauge
Bead Up	75 psi	374 psi
Heat Soak	0 psi	50 psi
Fuse/Cool	75 psi	374 psi

Fusion Specification

Fusion Type	Butt Fusion
Fusion Specification	ASTM F2620-19
Bead Time	0 seconds
Bead Size	3/8"
Heat/Soak Time	343 seconds
Fuse Time	839 seconds
Open/Close Time	20 seconds
Cool Time	0 seconds

	Minimum	Maximum
Bead Up	309 psi	439 psi
Heat Soak	0 psi	50 psi
Fuse	309 psi	439 psi
Cool	0 psi	0 psi

External Heater Temperatures

	Side A	Side B
One	415 F	
Two	415 F	
Three	415 F	
Four	415 F	

GPS Location

Date	Latitude	Longitude
2020-08-08 20:41:20.0	65°24'0.250800"N	96°42'11.451600"W

Weather Conditions

Ambient Temperature	70 F
Pipe Temperature	80 F
Weather Conditions	SUNNY
Type of Shelter	NONE

Logged Data Summary

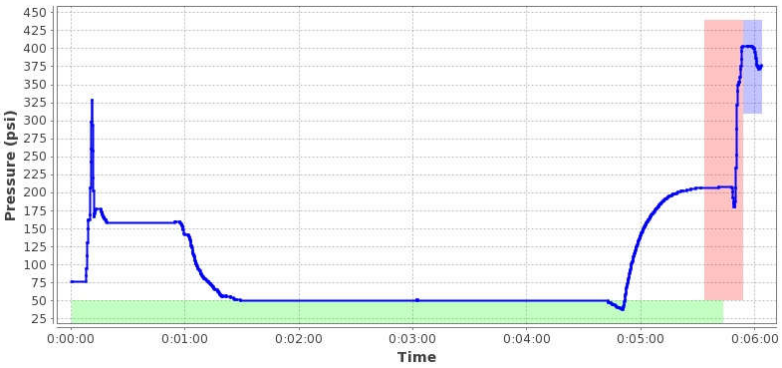
Number of Data Points	1498
Total Fusion Time	1234 seconds
Maximum Recorded Pressure	404 psi

Device Information

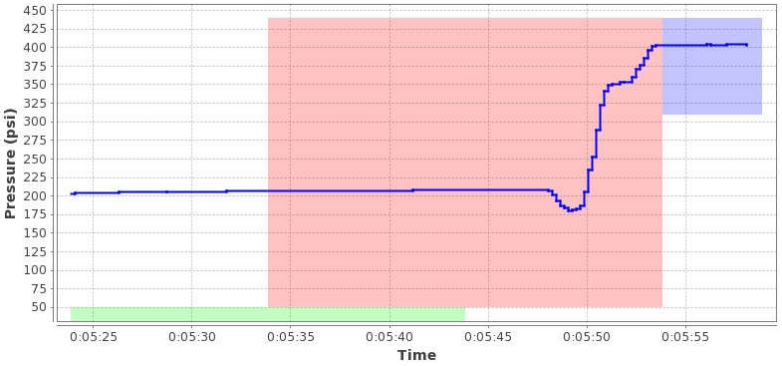
DataLogger Serial Number	RK303Z0645
Sensor Serial Number	MDL7499
Calibration Date	2020-05-28
Firmware Version	v6.0
Software Version	1.16 (39)
Software Product Name	DataLogger 6

Data Source

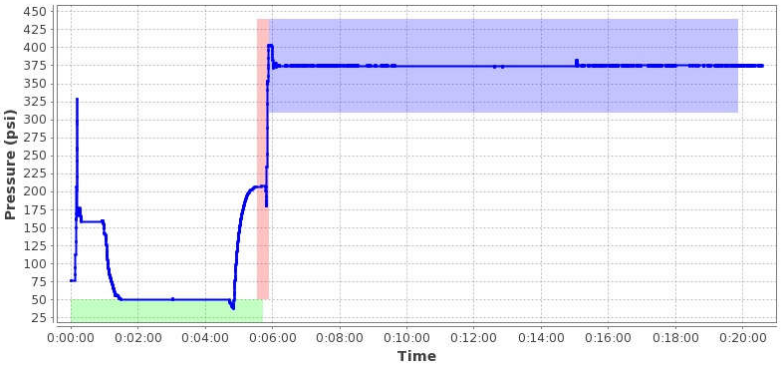
Front-end Plot



Heater Removal Plot



Summary Plot



Notes

Old pipes

2020-08-12 11:52:40 UTC
ABFArctic:
1- Yes
2- Yes
3- No

AGNICO EAGLE

AEM - CONSTRUCTION REPORT
QC - CHECKLIST

Date:	Team:
Line Number:	

Visual Inspection:

Type of pipe installed ☐ Diameter _____ ☐ DR _____
Insulation and heat trace installed ☐ Yes ☐ No
Flowmeter installed ☐ Yes ☐ No

Pipe condition (Storage/handling) ☐ Good ☐ Not good
Suction end installed ☐ Yes ☐ No

Starting point:	Pump / Discharge	Section #:
Joint range	From:	To:

Visual Inspection:

Gasket installed ☐ Yes ☐ No
Flange Bolt up completed and torqued ☐ Yes ☐ No
Valve installed and open ☐ Yes ☐ No

Pipe clean of debris ☐ Yes ☐ No
Section was caped at both ends ☐ Yes ☐ No

Starting point:	Pump / Discharge	Section #:
Joint range	From:	To:

Visual Inspection:

Gasket installed ☐ Yes ☐ No
Flange Bolt up completed and torqued ☐ Yes ☐ No
Valve installed and open ☐ Yes ☐ No

Pipe clean of debris ☐ Yes ☐ No
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Section was caped at both ends ☐ Yes ☐ No

Starting point:	Pump / Discharge	Section #:
Joint range	From:	To:

Inspected by: ______________________________

Signature: ______________________________